

**THE MEXICAN *FRANKLINIELLA PARICUTINENSIS* SP. NOV.  
SPECIES ASSEMBLAGE, IN THE "INTONSA GROUP"  
(INSECTA, THYSANOPTERA: THRIPIDAE)**

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**RESUMEN**

Se describen 13 especies nuevas de *Frankliniella* en el "Grupo Intonsa", del Eje Volcánico Transversal (una compartida con la Sierra Madre Oriental) de México, mismas que al compartir varios caracteres de coloración y morfología, integran un ensamble específico. Se analizan y discuten las probables relaciones de afinidad con el ensamble específico mexicano *Frankliniella desertileonidum* Watson y, en menor grado con el ensamble *F. intonsa* (Trybom). Se incluyen ilustraciones de cabeza, antenas, tórax y abdomen de cada especie.

**Palabras Clave:** Thysanoptera, Ensamble específico *Frankliniella paricutinensis*, Taxonomía, Especies nuevas, Distribución, México.

**ABSTRACT**

Thirteen new species of *Frankliniella* in the "Intonsa group" from the Mexican Volcanic Range (one shared with the Sierra Madre Oriental), are described herein. Because all these species share characters of color and morphology, they integrate a specific assemblage. The probable morphologic relationships with the Mexican *Frankliniella desertileonidum* Watson species assemblage, and in a minor grade with the *F. intonsa* (Trybom) species assemblage, are analyzed and discussed. Illustrations of the head, antennae, thorax and abdomen of each species, are included.

**Key Words:** Thysanoptera, *Frankliniella paricutinensis* species assemblage, Taxonomy, New Species, Distribution, Mexico.

**INTRODUCTION**

The definition of *Frankliniella paricutinensis* sp. nov. and 12 related new species as a "specific assemblage" within the "Intonsa group", was possible by means of the recognition of several morphologic characters, like the fore wings coloration and the lack of the postocular setae i (a shared character with the *Frankliniella desertileonidum* Watson assemblage, according to Johansen, 1998). The lack of the postocular setae i is supported by the evidence found in one adult specimen of *Frankliniella brevisaetaeoneillae* Johansen, 1998: in one side the setae formula

is: i-iii, IV, in the other: ii-iii, IV. Sakimura & O'Neill (1979) described and illustrated the same character in some species of the Minuta group: *F. pestinae* Sakimura & O'Neill and *F. crawfordi* Sakimura & O'Neill. Another evidence comes from the examination of *F. hemerocallis* J.C. Crawford adults: the females have the postocular setae formula i-iii, IV, whereas the males ii-iii, IV. However, *Frankliniella hemerocallis* belongs into a different "species assemblage". It is clear that the postocular setae i commonly exists in all species belonging into the Intonsa group (and in most of the genus species), but it was lost in the *Frankliniella desertionidum* Watson, *F. paricutinensis* sp. nov. and *F. aurea* Moulton species assemblages, thus having the formula: ii-iii, IV. The adults of the species in the *Frankliniella paricutinensis* species assemblage appear to be like those of the also Mexican montane species *F. fallaciosa* Priesner and *F. parvifossis* Priesner. However, in the last two species the postocular setae formula is i-iii, IV, and they belong into the *Frankliniella insularis* (Franklin) species assemblage.

Since the species number in the Intonsa group is still increasing, creating more classification problems, as mentioned by Mound & Marullo (1996), species assemblage is a good neutral classification solution. This last proposal is particularly reliable for the New World, where the genus *Frankliniella* is represented by 151 species, according to Nakahara (1997).

The terms assemblage, and group are used here as neutral terms, according to Mayr and Ashlock (1991).

## MATERIAL AND METHODS

The adult illustrations from each of the species, were taken from Canada balsam mounted slides. They are realistic microscopic interpretations that were done using a camera-lucida equipment, and two magnifications: 400 and 1000 X.

### Depositories

IBUNAM = Instituto de Biología, Universidad Nacional Autónoma de México, México, D.F.

### Abbreviatures

#### Head

intocc = interocellar setae (pair III)  
postoc = postocular setae i-iii, IV

#### Pronotum

AA = Major anteroangular setae  
AM = Major anteromarginal setae  
PA = Major posteroangular setae  
am = minor anteromarginal setae  
pm = minor posteromarginal setae

Abdomen

IXi, IXii, IXiii = Tergite IX major caudal setae; Xi, Xii = Tergite X major subposteromarginal setae.

**The *Frankliniella paricutinensis* sp. nov. species assemblage.**

**Diagnosis.** Small species (females: 1.35-1.86; males: 1.21-1.49 mm in length) in the *Intonsa* group: Body color predominantly dark chestnut to blackish brown, with abundant orange subhypodermal pigment. Antennal segments III-V bicolored yellow and brown. Tarsi yellow to yellowish-brown. Fore wings dark chestnut brown, with a white-hyaline sub-basal band; hind wings whitish-yellow, with a dark brown median longitudinal vitta. Ocellar crescents orange to red. Body setae dark blackish-brown.

**Morphology.** Head (Figs. 1-5, 30, 37, 44) broader than long in posterior one half; occiput sculptured with open, parallel and confluent (at middle and sides) striae. Postocular setae formula: II-III, IV. Compound eyes ellipsoidal, slightly or not protruding. Antennal segments typical in the group (Figs. 11, 16, 20, 33, 40, 47), III with slightly fungiform pedicel, IV-VI globose-elongate. Mouth cone pointed, shorter to longer than the dorsal length of head. Pronotum (Figs. 1-5, 30, 37, 44) with its surface mainly smooth, but with some faint transverse striae in anterior margin, which become stronger in posterior margin. Mesonotal plate (Figs. 12, 14, 17, 21, 34, 41, 48) transverse, hexagonal and with open transverse striae, which become confluent at center and sides. Metanotal scutum (Figs. 10, 13, 18, 22, 35, 49) with polygonal reticulation forming a triangle at center (transverse anteriorly, longitudinal behind), and longitudinal striae at sides; setae in anterior margin.

Pterosternum (Figs. 6-8, 31, 38, 45) with transverse hexagonal to nearly pentagonal mesosternum, mesofurca and spinula strong. Tergites VIII (Figs. 24-27, 29, 32, 39, 46) with a complete posteromarginal comb. Segment X longer than broad. Males with one circular to slightly ellipsoidal glandular area on each of sternites II-VII (Fig. 28).

**Specific differential characters.** Body size proportions are variable between adults of the species. Antennal segments III-V, as well as tarsi, are variable in color. There are remarkable differences in the head chaetotaxy and occiput sculpture, antennal segments (length versus width); the pronotal sculpture and chaetotaxy. The meso- and metanotal sculpture also varies, as well as the mesosternal morphology. The tergite I plate is also variable.

**Comments.** The studied material is scarce, but good. A total of 54 adult specimens were considered; from these 41 are females and only 13 males. From the described 13 new species, only five had bisexual descriptions and eight were described with females only: four with more than one specimen, and four holotypically.

**Relations with other assemblages within the *Intonsa* group.** The adults of both sexes from the species in the *Frankliniella paricutinensis*, *F. desertileonidum* Watson, and *F. aurea*

Moulton, are different from those in the other assemblages within the Intonsa group, because of the lack of postocular setae i, thus giving the setae formula: ii-iii, IV (two minor setae, plus a long and stouter one), whereas in the other complexes the formula is: i-iii, IV. In the case of the *Frankliniella paricutinensis* sp. nov. assemblage the fore wings color (dark brown with a sub-basal white band) is the main difference with the *F. desertileonidum* assemblage: dark brown, with two white transverse bands: one sub-basal, the other apical in the sense of Johansen (1998). The dark brown fore wings with a white sub-basal transverse band, is a shared character with the species in the *Frankliniella intonsa* (Trybom) and *F. insularis* (Franklin) assemblages. In the case of the *Frankliniella aurea* Moulton species assemblage, the clear yellow fore wings is a shared character with the *F. occidentalis* (Pergande) species assemblage.

**Key for separating the *Frankliniella aurea* Moulton, *F. desertileonidum* Watson, *F. paricutinensis* sp. nov., and *F. hemerocallis* J.C. Crawford assemblages within the intonsa group.**

1. Postocular setae i wanting; formula: ii-iii, IV, v-vi . . . . . 2
  - Postocular setae i present; formula: i-iii, IV, v-vi . . . . . the other assemblages
2. Fore wings dark chestnut brown, with two white transverse bands: basal and apical or, only the basal one present; body predominantly dark chestnut brown . . . . . 3
  - Fore wings and body predominantly clear yellow . . . . . *F. aurea* Moulton assemblage
3. Fore wings with the white basal band only . . . . . 4
  - Fore wings with the white basal and apical bands . . . . .
    - . . . . . *F. desertileonidum* Watson assemblage
4. Tergite VIII with a complete posteromarginal comb; metanotal scutum with a pair of campaneiform sensilla . . . . . *F. paricutinensis* sp. nov. assemblage
  - Tergite VIII with a broad median gap in the posteromarginal comb; metanotal scutum without a pair of campaneiform sensilla . . . . .
    - . . . . . Adult males of *F. hemerocallis* J.C. Crawford.

**TAXONOMIC LIST**

- |   |  |
|---|--|
| 1. <i>Frankliniella axochcoensis</i> sp. nov. | 8. <i>F. nauhcampatepetlensis</i> sp. nov. |
| 2. <i>F. carmenmendietae</i> sp. nov.         | 9. <i>F. paricutinensis</i> sp. nov.       |
| 3. <i>F. copilcoensis</i> sp. nov.            | 10. <i>F. popocatepetlensis</i> sp. nov.   |
| 4. <i>F. exiguavulcanoperotensis</i> sp. nov. | 11. <i>F. vulcanorizabaensis</i> sp. nov.  |
| 5. <i>F. festucavulcanica</i> sp. nov.        | 12. <i>F. vulcanoperotensis</i> sp. nov.   |
| 6. <i>F. jaroslavpelikani</i> sp. nov.        | 13. <i>F. vulcanotolucensis</i> sp. nov.   |
| 7. <i>F. lopezochoterenai</i> sp. nov.        |  |

Key to the species in the *Frankliniella paricutinensis* species assemblage.

1. Pronotum smooth at center . . . . . 2
  - Pronotum with 1-4 setae at center . . . . . 5
2. Pronotum with 1-2 subposteromarginal setae . . . . . 3
  - Pronotum lacking subposteromarginal setae . . . . . *F. vulcanorizabaensis* sp. nov.
3. Anteoocellar setae (pairs I-II) shorter to subequal than one ocellar diameter; interocellar setae (pair III) moderately long (2.5-3.3 times of an ocellar diameter). Antennal segment III slightly shorter than VI . . . . . 4
  - Anteoocellar setae (pairs I-II) longer than one ocellar diameter; interocellar setae (pair III) long (4.0 times of an ocellar diameter). Antennal segment III longer than VI . . . . . *F. vulcanotolucensis* sp. nov.
4. Major pronotal anteroangular and anteromarginal setae shorter than posteromarginal ii. Anteoocellar setae (pairs I-II) shorter than pronotal minor anteromarginal setae . . . . . *F. festucavulcanica* sp. nov.
  - Major pronotal anteroangular and anteromarginal setae subequal in length to posteromarginal ii. Anteoocellar setae (pairs I-II) subequal in length to pronotal minor anteromarginal setae . . . . . *F. exiguavulcanoperotensis* sp. nov.
5. Mesosternal plate hexagonal, with straight sides . . . . . 6
  - Mesosternal plate with fore marginal and anterolateral sides broadly curved. Tergite VIII with posteromarginal comb bearing sparse microtrichia . . . . . *F. vulcanoperotensis* sp. nov.
6. Pronotum with a pair of median subposteromarginal setae . . . . . 7
  - Pronotum lacking subposteromarginal setae . . . . . *F. copilcoensis* sp. nov.
7. Pronotal major anteromarginal setae subequal to shorter than postocular IV . . . . . 8
  - Pronotal major anteromarginal setae longer than postocular IV . . . . . 10
8. Pronotum with only one pair of setae at center; metanotal scutum with transverse reticulation in anterior one fourth, followed by small equiangular polygons, and elongate reticulation in posterior one half . . . . . 9
  - Pronotum with four setae forming a rhombus; metanotal scutum sculptured with transverse polygons in anterior one third, followed by equiangular polygons at center surrounded by elongate reticulation . . . . . *F. jaroslavpelikani* sp. nov.
9. Interocellar setae (pair III) longer than compound eyes width and postocular setae IV . . . . . *F. nauhcampatepetlensis* sp. nov.
  - Interocellar setae (pair III) shorter than compound eyes width, and subequal to postocular setae IV . . . . . *F. axochcoensis* sp. nov.
10. Anteoocellar setae (pair I) shorter than the lateral ones (pair II), or one ocellar diameter; postocular v longer . . . . . 11
  - Anteoocellar setae (pair I) subequal in length to lateral ones (pair II), both longer than one ocellar diameter, but subequal to postocular v . . . . . 12
11. Mesosternal plate with both anterolateral sides longer than the rest. Postocular setae ii longer and stouter than iii or IV . . . . . *F. paricutinensis* sp. nov.

- Mesosternal plate with both anterolateral sides subequal to the posterior ones. Postocular setae ii subequal in length to iii, both shorter than v . . . . . *F. lopezochoterenai* sp. nov.
- 12. Pronotum with one setae at center; metanotal scutum sculptured with transverse polygons in anterior one third, followed by elongate reticulation in posterior two thirds . . . . . *F. carmenmendietae* sp. nov.
- Pronotum with four setae forming a curve at center; metanotal scutum with some close transverse polygons in anterior one sixth, followed by large equiangular polygons, and elongate reticulation in posterior one half, and with some equiangular polygons at base . . . . . *F. popocatepetlensis* sp. nov.

*Frankliniella axochcoensis* sp. nov.

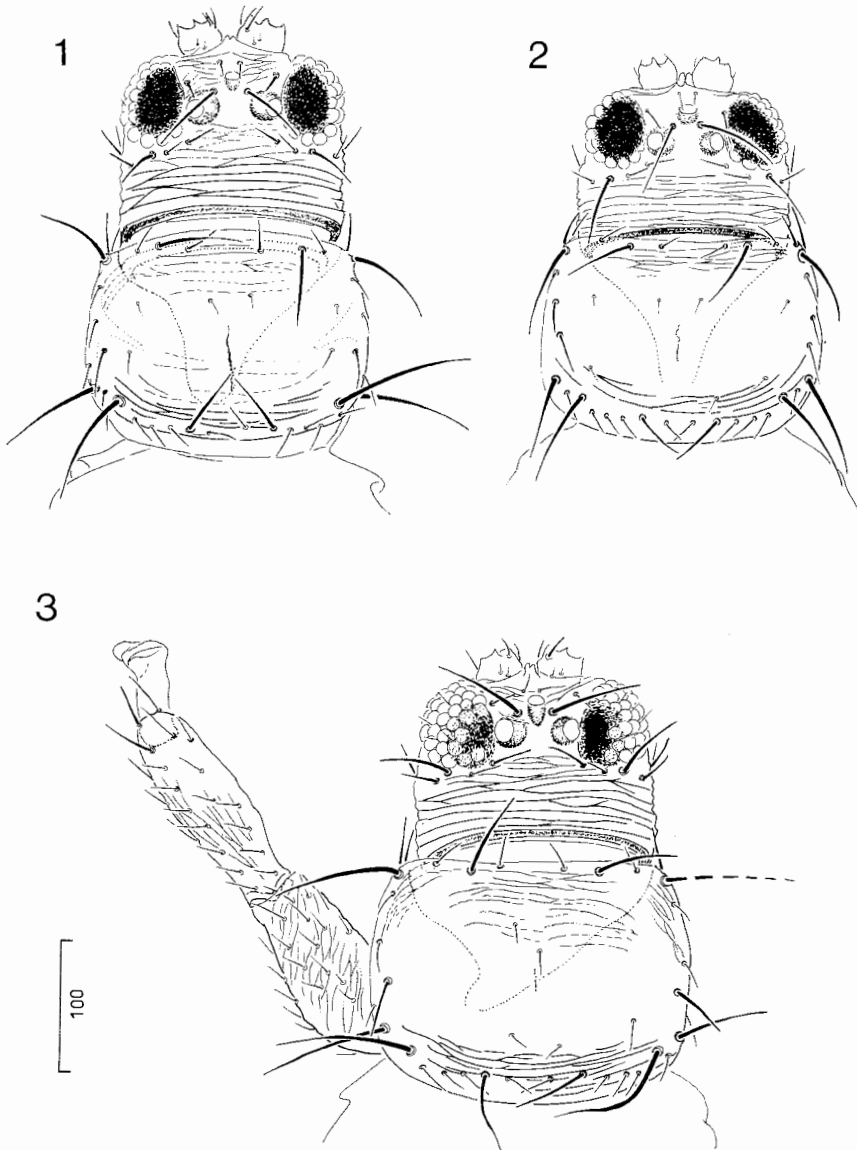
(Figs. 5-6, 10, 14-15, 24, 94)

**Female.** Body color typical, except: antennal segments, II dark chestnut brown, yellow in apical end; III yellow, with a white sub-basal ring, and light brown in apical third; IV yellow, brown in apical half; V-VI brown, each with a lighter sub-basal ring. Fore tibiae yellow in both ends. All tarsi yellowish-brown.

**Morphology.** Head in dorsal aspect (Fig. 5), broader (1.53 times) than long at middle; cheeks sinuouse; occiput sculptured with close transverse striae, becoming closer and confluent at center. Chaetotaxy as follows: anteoellar (pairs I-II) small (subequal to slightly longer than one ocellar diameter and subequal to postoculars ii-iii); interocellars (pair III) moderately long, shorter to longer than postocular IV. Antennal segments: III longer than IV, but both longer than VI. Mouth-cone as long as dorsal length of head. Pronotum (Fig. 5) almost smooth, but with faint transverse and confluent striae on anterior one third; chaetotaxy as follows: major setae; anteroangulars stouter and about twice longer than anteromarginals; inner posteroangulars slightly shorter than outers; 1-2 small subposteromarginals. Pterothorax; mesonotum (Fig. 14); metanotum (Fig. 10); pterosternum (Fig. 6) Abdomen; tergite I (Fig. 15); tergites VIII-X (Fig. 24).

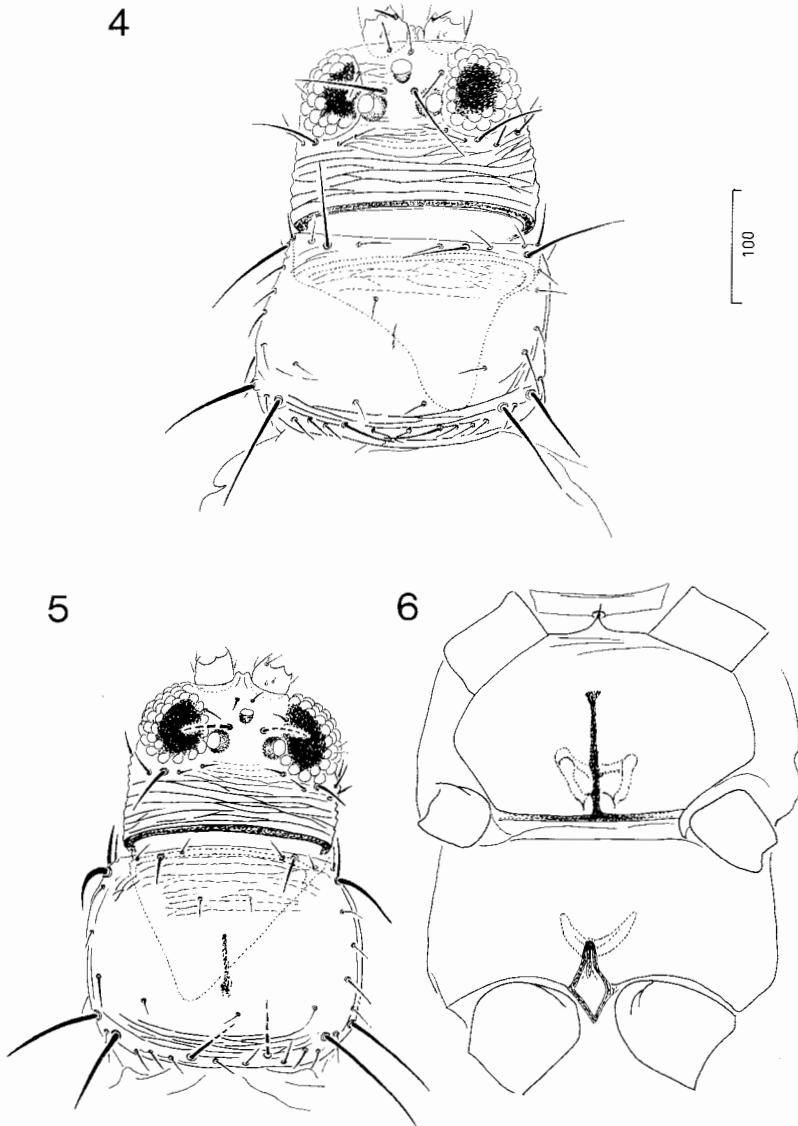
**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.86 mm.

Head dorsal length: 104. Width at eyes: 150. behind eyes: 148, middle: 160, basal: 156. Chaetotaxy, intocc: 28; postoc: ii-iii 20, IV 30. Compound eyes, length: 56, width: 50. Ocelli, fore: 12, hind: 16. Antennal segments, length (width): I 30 (32), II 40 (26), III 54 (22), IV 52 (22), V 40 (18), VI 50 (20), VII 10 (8), VIII 16 (6). Thorax; pronotum, length: 166; width at middle: 206. Chaetotaxy, major setae: AA 50, AM 40; PA, outer: 86, inner: 80; minor setae: aa 30, am 16; pm i: 20, ii: 50, iii: 20. Mesothorax, width: 280; metathorax, width: 315. Fore wings, width at base: 100, middle: 70; veins chaetotaxy, fore: 25, hind: 19. Abdomen; width at segment IV: 360. Tergite IX setae, IX I: 120, IX ii: 140. Tergite X setae, X i: 140.



Figures 1-3

Dorsal views of the head and pronotum of adults from *Frankliniella* spp. 1. *copilcoensis* sp. nov. Holotype ♀ (corrected); 2. *idem*, Paratype ♂. 3. *paricutinensis* sp. nov. Holotype ♀ (with left fore leg). Scale in  $\mu\text{m}$ , same (400 X) for all figures.



Figures 4-6

Dorsal views of the head and pronotum, with a ventral view of the pterosternum of the adults from *Frankliniella* spp. 4. *carmenmendietae* sp. nov. Holotype ♀. 5. *axochcoensis* sp. nov. Holotype ♀; 6. *Idem*, pterosternum. Scale in  $\mu\text{m}$ , same (400 X) for all figures.



**Material examined.** Holotype ♀; paratypes: 6 ♀♀. MEXICO; DISTRITO FEDERAL: Sierra de Ajusco, on road to the Ajusco Vulcano, 2900 m.; 26-I-1979; in dry leaves of shrubs (Alfonso N. García), in IBUNAM.

**Comments.** Adults of *Frankliniella axochcoensis* sp. nov., are different from those of the other species in the assemblage, in the smaller body size, and the small head setae. Furthermore, *F. axochcoensis* is close to *F. carmenmendietae* because both bear a pair of pronotal subposteromarginal setae. However, in *F. axochcoensis* the pronotal major anteromarginal setae are subequal to shorter than postocular IV.

**Derivatio nominis:** from Náhuatl Axochco: atl= water, xochitli= flowering, co= in; in the flowing water, according to Macazaga (1979).

*Frankliniella carmenmendietae* sp. nov.

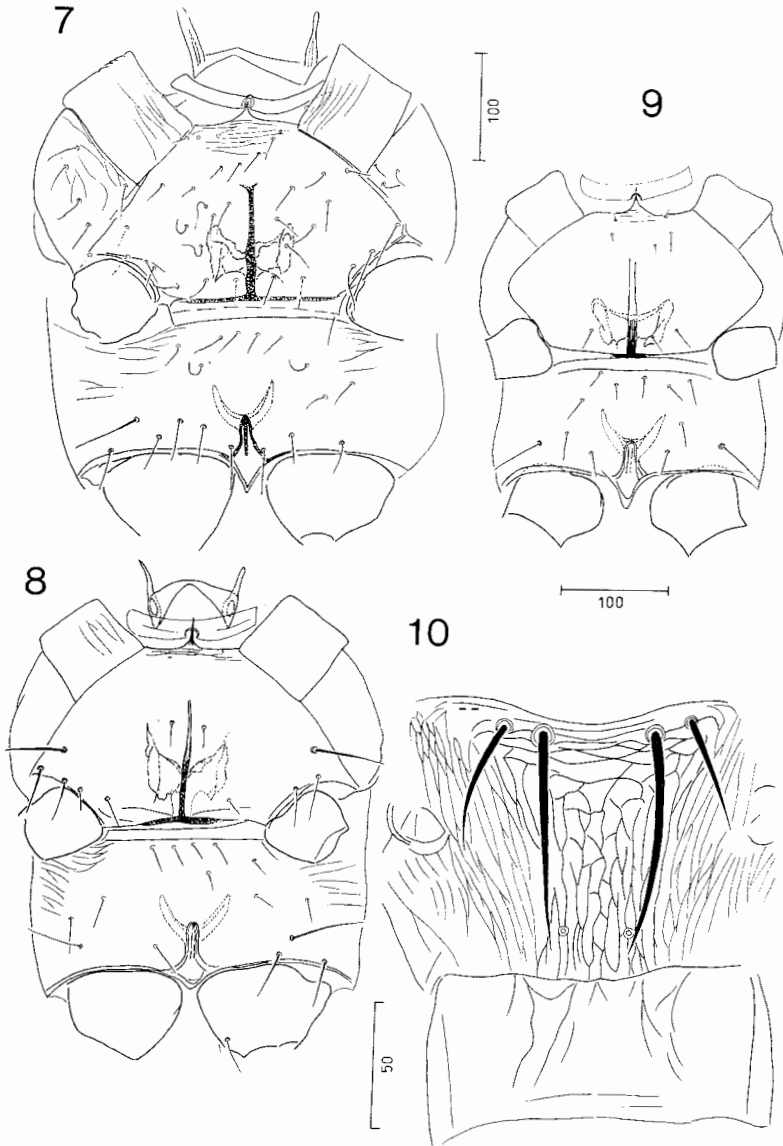
(Figs. 4, 7, 20-23, 25, 60, 84-85, 94)

**Female.** Body color typical, except: lighter in abdominal segments I-VI. Antennal segments: II dark chestnut brown, lighter in apical one fourth; III yellow, darkened with brown in apical two thirds; IV yellowish-brown in basal one third, the rest dark brown; V dark brown in basal one fourth. Fore tibiae yellow in both ends. Fore tarsi yellow, middle and hind yellowish-brown.

**Morphology.** Head in dorsal aspect (Fig. 4), broader (1.45 times) than long at middle; cheeks straight; occiput with parallel transverse striae, confluent in both sides. Antennal segments (Fig. 20), III the longest; VI shorter than IV. Mouth-cone shorter than dorsal length of head. Pronotum (Fig. 4) almost smooth, but with some faint transverse striae on anterior margin; with a pair of median small subposteromarginal setae. Pterothorax; mesonotum (Fig. 21); metanotum (Fig. 22); pterosternum (Fig. 7), mesofurca with strong spinula. Abdomen; tergite I (Fig. 23); tergites VIII-X (Fig. 25); tergite VIII with the posteromarginal comb with closer microtrichia at center.

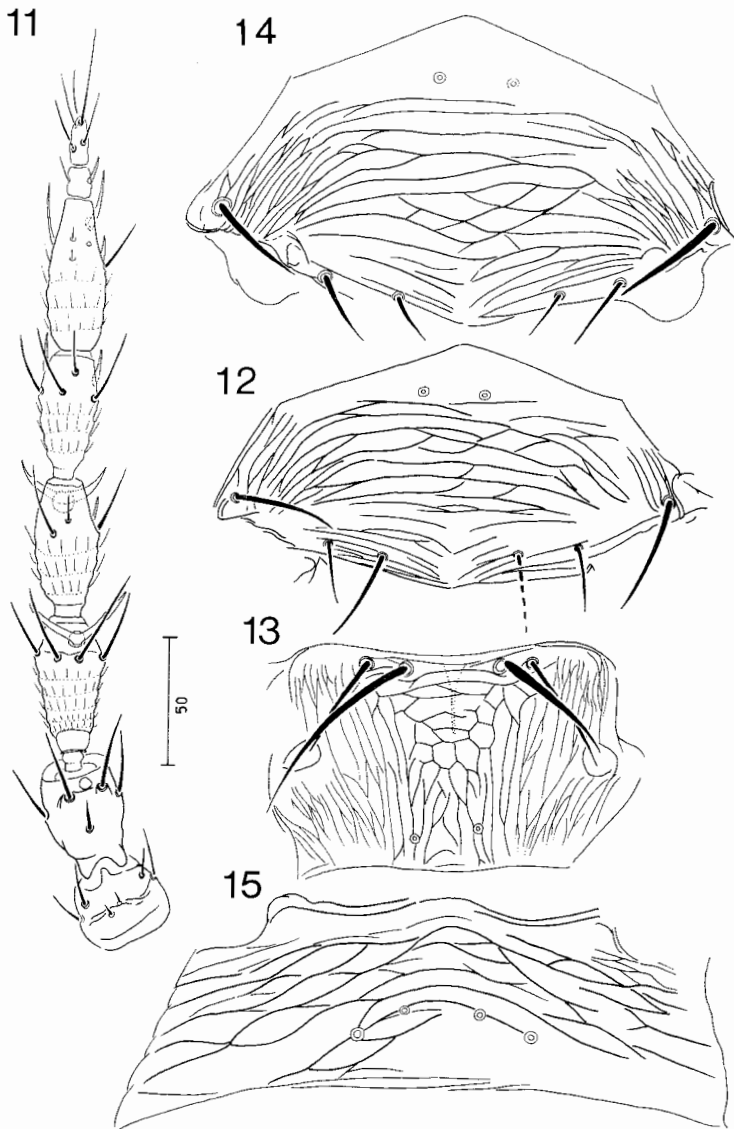
**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.80 mm.

Head dorsal length: 124. Width at eyes: 160, behind eyes: 170, middle: 180, basal: 190. Chaetotaxy, intocc: 64; postoc: ii 18, iii 28, IV 50, v 30. Compound eyes, length: 66, width: 50. Ocelli, fore: 14, hind: 16. Antennal segments, length (width): I 30 (32), II 40 (26), III 58 (24), IV 54 (22), V 42 (18), VI 52 (20), VII 10 (8), VIII 18 (6). Thorax; pronotum, length: 160; width at middle: 220. Chaetotaxy, major setae: AA 30, AM 22; PA, outer: 70, inner: 90; minor setae: aa 34, am 22; pm i: 20, ii: 40, iii: 20. Mesothorax, width: 370; metathorax, width: 370. Fore wings, width at base: 120, middle: 70; veins chaetotaxy, fore: 18, hind: 17. Abdomen; width at segment IV: 408. Tergite IX setae, IX i: 144, IX ii: 146. Tergite X setae, X i: 150.



Figures 7-10

Ventral views of pterosterna, and dorsal view of the metanotum of adults from *Frankliniella* spp. 7. *carmenmendietae* sp. nov. Holotype ♀. 8. *paricutinensis* sp. nov. Holotype ♀. 9. *copilcoensis* sp. nov. Holotype ♀. 10. *axochcoensis* sp. nov. Holotype ♀ (metanotum). Scales in  $\mu\text{m}$ , same (400 X) for figures 7-9; same (1000 X) for figure 10.



Figures 11-15

Dorsal views of adults from *Frankliniella* spp. 11. *copilcoensis* sp. nov. Holotype ♀ right antenna; 12. *Idem*, mesonotum; 13. *Idem*, metanotal scutum. 14. *axochcoensis* sp. nov. Holotype ♀ mesonotum; 15. *Idem*, tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.

**Male** (Figs 60, 84-85). Virtually like adult female. Head and pronotum (Fig. 60) like in female. Sternites II-VII each with an ellipsoidal glandular area (Fig. 84). Tergites VIII-X (Fig. 85).

**Measurements** (Paratype ♂ in  $\mu\text{m}$ ). Body length: 1.33 mm.

Head dorsal length: 98. Width at eyes: 132, behind eyes: 130, middle: 140, basal: 134. Chaetotaxy, intocc: 44; postoc: ii-iii 14, IV 40. Compound eyes, length: 52, width: 40. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 22 (26), II 34 (22), III 46 (20), IV 40 (18), V 34 (16), VI 44 (16), VII 8 (8), VIII 12 (4). Thorax; pronotum, length: 120, width at middle: 186. Chaetotaxy, major setae: AA 64, AM 44; PA, outer: 68, inner: 66; minor setae: aa 26, am 14; pm i: 12, ii: 30, iii: 12. Mesothorax, width: 240; metathorax, width: 214. Fore wings, width at base: 84, middle: 42; veins chaetotaxy, fore: 19, hind: 16. Abdomen; width at segment IV: 228. Tergite IX setae, IX i: 36, IX ii: 94. Tergite X setae, X i: 110.

**Material examined.** Holotype ♀, paratypes: 2 ♂♂. MEXICO; DISTRITO FEDERAL: Ciudad de México, Pedregal de San Angel, 2240 m.; 14-XII-1977 (Holotype ♀) in *Senecio praecox* (María del Carmen Mendieta), en IBUNAM. Idem, Sierra de Ajusco, km 44 on road Méx-142 (México-City-Cuernavaca, Morelos), 2680 m.; 25-X-1985 (Paratype ♂) in *Muhlenbergia macroura* within *Pinus* Forest (María Luisa Montes de Oca & Roberto M. Johansen), in IBUNAM. ESTADO DE MEXICO: South of Nevado de Toluca Vulcano, km 22 on road Méx-36 Toluca-Sultepec, 3060 m.; 30-V-1987 (Paratype ♂), in *Muhlenbergia* sp. within *Abies-Pinus* Forest (María Luisa Montes de Oca & R.M. Johansen), in IBUNAM.

**Comments.** Adults of *F. carmenmendietae* sp. nov., are different from the other species in the assemblage (see comments in *F. axochcoensis*), because of the trapezoidal dorsal outline of the head, the morphology of the prothorax and tergites VIII-X. This species is named honouring the memory of Miss. María del Carmen Mendieta-Sevilla († 1986) a young Mexican Thysanopterist, as a tribute of friendship.

*Frankliniella copilcoensis* sp. nov.

Figs. 1-2, 9, 11-13, 27-29, 94)

**Female.** Body color typical, except: antennal segments, I lighter than head; II lighter in apical one third; III yellowish brown, with a sub-basal whitish ring; IV-V lighter in basal one fifth. Fore tibiae yellow in both ends. All trochanters and tarsi yellow.

**Morphology.** Head in dorsal aspect (Fig. 1), broader (1.37 times) than long at middle; cheeks slightly sinuouse; broader at base; occiput sculptured with open transverse and confluent striae. Antennal segments (Fig. 11). Mouth-cone as long as dorsal length of head. Pronotum (Fig. 1) with some faint transverse striae on anterior margin and posterior one fifth, but some stronger striae in posterior margin; without subposteromarginal setae. Pterothorax;

mesonotum (Fig. 12), metanotum (Fig. 13); pterosternum (Fig. 9) with hexagonal mesosternal plate. Abdomen; tergites VIII-X (Fig. 27); tergite VIII with posteromarginal comb with well spaced microtrichia.

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.35 mm.

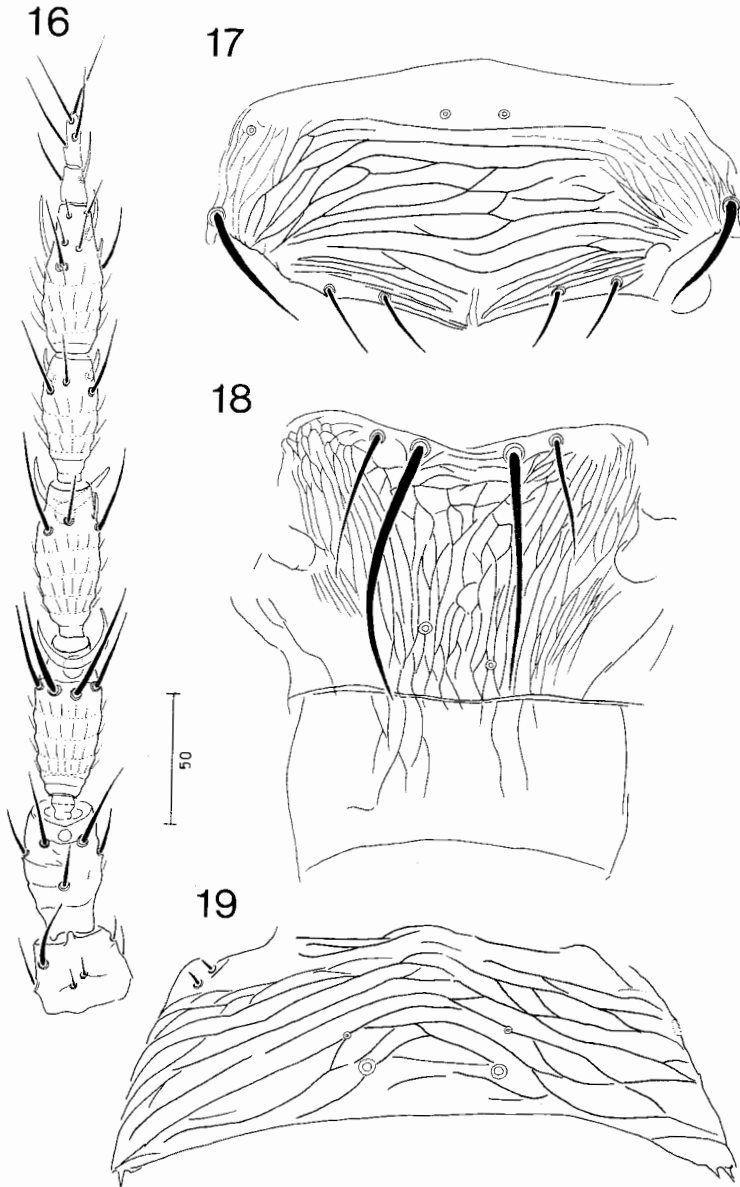
Head dorsal length: 106. Width at eyes: 146, behind eyes: 140, middle: 146, basal: 148. Chaetotaxy, intocc: 48; postoc: ii-iii 18, IV 28. Compound eyes, length: 60, width: 44. Ocelli, fore: 12, hind: 12. Antennal segments, length (width): I 26 (30), II 38 (26), III 59 (22), IV 44 (20), V 40 (18), VI 50 (18), VII 10 (8), VIII 16 (6). Thorax; pronotum, length: 144; width at middle: 190. Chaetotaxy, major setae: AA 60, AM 52; PA, outer: 70, inner: 84; minor setae: aa 30, am 20; pm i: 20, ii: 46, iii: 20. Mesothorax, width: 220; metathorax, width: 250. Fore wings, width at base: 90, middle: 50; veins chaetotaxy, fore: 20, hind: 14. Abdomen; width at segment IV: 300. Tergite IX setae, IX i: 118, IX ii: 136. Tergite X setae, X i: 120.

**Male** (Figs. 2, 28-29). Virtually like adult female. Head (Fig. 2) with much longer postocular setae iii. Pronotum (Fig. 2) with one subposteromarginal setae. Sternites II-VII each with a circular to slightly ellipsoidal glandular area (Fig. 28). Tergites VIII-X (Fig. 29).

**Measurements** (Paratype ♂ in  $\mu\text{m}$ ). Body length: 1.26 mm.

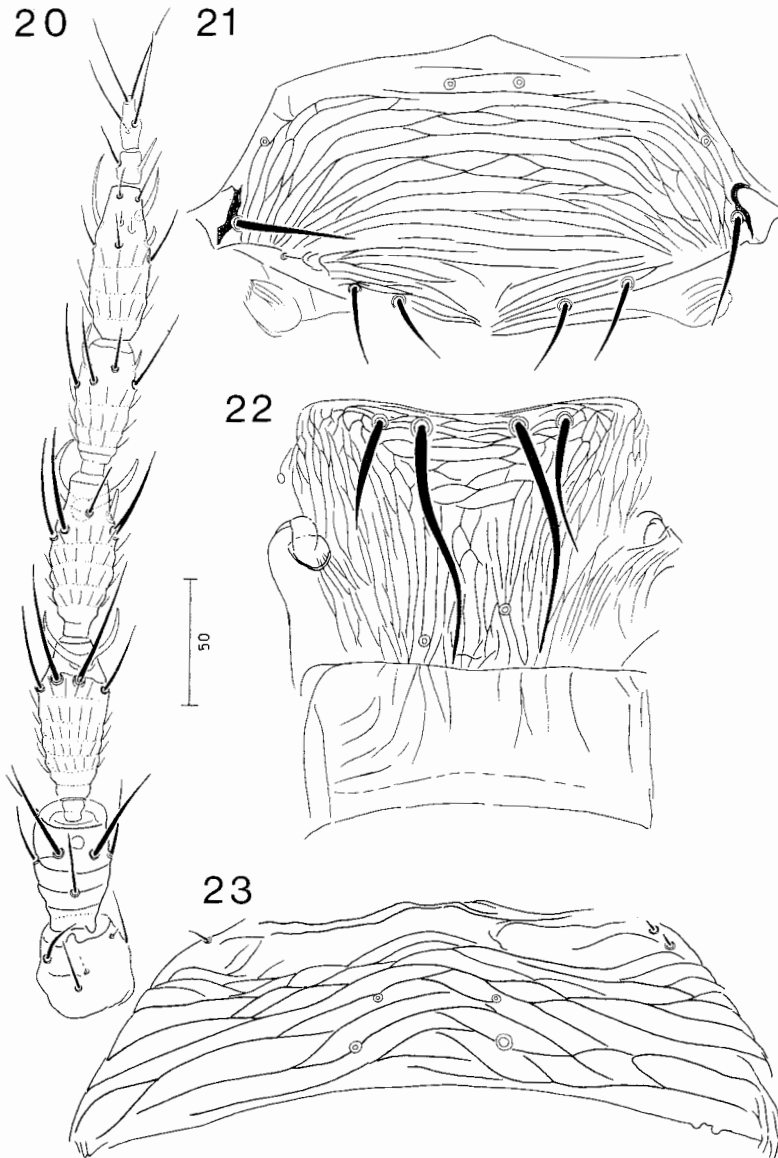
Head dorsal length: 104. Width at eyes: 146, behind eyes: 144, middle: 146, basal: 144. Chaetotaxy, intocc: 60; postoc: ii-iii 20, IV 32. Compound eyes, length: 56, width: 50. Ocelli, fore and hind: 16. Antennal segments, length (width): I 22 (26), II 34 (22), III 48 (20), IV 42 (20), V 36 (29), VI 44 (16), VII 8 (6), VIII 16 (4). Thorax; pronotum, length: 140, width at middle: 190. Chaetotaxy, major setae: AA 64, AM 50; PA, outer: 70, inner: 76; minor setae: aa 28, am 14; pm i: 16, ii: 40, iii: 16. Mesothorax, width: 230; metathorax, width: 240. Fore wings, width at base: 90, middle: 60; veins chaetotaxy, fore: 17, hind: 16. Abdomen; width at segment IV: 124. Tergite IX setae, IX i: 34, IX ii: 100. Tergite X setae, X i: 110.

**Material examined.** Holotype ♀; paratypes: 6 ♀♀, 7 ♂♂. MEXICO: DISTRITO FEDERAL: Ciudad de México, Pedregal de San Angel, 2240 m.; 6-X-1977 (Holotype ♀, paratypes: 3 ♀♀); in flowers of *Tagetes peduncularis* (María del Carmen Mendieta), in IBUNAM; *Idem et Ibidem*, 31-X-1977 (Paratype ♀) (María del Carmen Mendieta), in IBUNAM. *Idem*, Sierra de Ajusco km 42 on road Méx-95 (Mexico City-Cuernavaca, Morelos) 3000 m.; 24-I-1987 (Paratypes: 2 ♀♀, 1 ♂), in shrubs of *Bacharis* and *Senecio* within *Pinus* Forest (R.M. Johansen), in IBUNAM; *Idem et Ibidem*, 21-I-1987 (Paratypes: 3 ♂♂), in Poaceae (*Muhlenbergia* sp. ?) (R.M. Johansen), in IBUNAM. HIDALGO: Sierra de Pachuca (Volcanic Range), 1 km N of Real del Monte, 2600 m.; 9-XI-1981 (paratypes: 3 ♂♂); in green and dry grass (*Muhlenbergia* sp. ?), (Roberto M. Johansen), in IBUNAM.



Figures 16-19

Dorsal views of *Frankliniella paricutinensis* sp. nov. Holotype ♀. 16. Right antenna; 17. Mesonotum; 18. Metanotum; 19. Tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.



Figures 20-23

Dorsal views of *Frankliniella carmenmendietae* sp. nov. Holotype ♀. 20. Right antenna; 21. Mesonotum; 22. Metanotum; 23. Tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.

**Comments.** Adults of *Frankliniella copilcoensis* sp. nov., are close to those of *F. axochcoensis*, *F. carmenmendietae*, *F. paricutinensis* and *F. lopezochoterenai*, because they share the following characters: the pronotum with a median transverse row of 1-3 setae, and the pterosternum with a hexagonal mesosternal plate with straight sides. However, *F. copilcoensis* is different because it lacks the pronotal median pair of subposteromarginal setae.

**Derivatio nominis:** From Náhuatl, Copilco: copilli = the lord's crown, co = place, the place of the lordship crown, according to Macazaga, 1979.

*Frankliniella exiguavulcanoperotensis* sp. nov.

(Figs. 65-66, 71-75, 94)

**Female.** Body color typical, except: antennal segments, III light brown; IV light brown in basal one third, the rest darker. Fore tibiae light brown. All tarsi brown. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 65), broader (1.46 times) than long at middle; cheeks sinuouse, broader at middle; occiput sculptured with close parallel striae. Antennal segments (Fig. 71); segments III and IV subequal in length. Mouth-cone longer than head's dorsal length. Pronotum (Fig. 65) with some faint transverse striae on anterior margin; without setae at center. Pterothorax; mesonotum (Fig. 72); Metanotum (Fig. 73). Abdomen; tergite I (Fig. 74); tergites VIII-X (Fig. 75).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.23 mm.

Head dorsal length: 90. Width at eyes: 126, behind eyes: 126, middle: 132, basal: 130. Chaetotaxy, intocc: 40; postoc; ii 12, iii 10, IV 36, v 16. Compound eyes, length: 44, width: 36. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 26 (24), II 38 (24), III 44 (22), IV 38 (20), V 34 (18), VI 44 (16), VII 8 (8), VIII 14 (4). Thorax; pronotum, length: 120; width at middle: 170. Chaetotaxy, major setae: AA 50, AM 40; PA, outer: 54, inner: 60; minor setae: aa 20, am 14; pm i: 12, ii: 36, iii: 10. Mesothorax, width: 216; metathorax, width: 204. Fore wings, width at base: 86, middle: 46; veins chaetotaxy, fore: 18, hind: 13. Abdomen; width at segment IV: 280. Tergite IX setae, IX i: 106, IX ii: 116. Tergite X setae, X i: 110.

**Material examined.** Holotype ♀. MEXICO; VERACRUZ: Volcanic Range North West source of the Cofre de Perote (Nauhcampatépetl) vulcano, 2880 m.; 8-V-1982; in dry litter under *Alnus* sp. tree within *Pinus-Quercus* Forest (Roberto M. Johansen & Aurea Mojica-Guzmán), in IBUNAM.

**Comments.** Adults of *Frankliniella exiguavulcanoperotensis* sp. nov., are related to those of *F. festucavulcanica*. However, in *F. exiguavulcanoperotensis* the pronotal major



anteroangular and anteromarginal setae are subequal in length to the posteromarginal ii (in *F. festucavulcanica* are shorter).

**Derivatio nominis:** from Latin: exigua = little, vulcano; Spanish: Perote = nickname of Pero, Pedro (Peter), the name of a city and the near vulcano; Latin: ensis, a locative.

***Frankliniella festucavulcanica* sp. nov.**

(Figs. 63-64, 81-83, 94)

**Female.** Body color typical, except: antennal segments, III yellow; IV yellow in basal one half, the rest darkened with brown; V light brown in extreme base, the rest dark brown. Fore tibiae yellowish-brown. All tarsi yellow. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 63), broader (1.56 times) than long at middle; cheeks sinuouse, broader at middle; occiput sculptured with close parallel striae. Antennal segments III-IV subequal in length, both shorter than VI. Mouth-cone longer than head's dorsal length. Pronotum (Fig. 63), broader (1.5 times) than long at middle, almost smooth, and without setae at center. Pterothorax; mesonotum (Fig. 81); metanotal scutum (Fig. 82). Abdomen; tergites VIII-X (Fig. 83).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.13 mm.

Head dorsal length: 88. Width at eyes: 134, behind eyes: 130, middle: 138, basal: 130. Chaetotaxy, intocc: 36; postoc: ii 18, iii 14, IV 30, v 18. Compound eyes, length: 50, width: 36. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 26 (26), II 36 (24), III 40 (20), IV 40 (20), V 36 (18), VI 48 (16), VII 8 (8), VIII 14 (6). Thorax, pronotum length: 126, width at middle: 188. Chaetotaxy, major setae: AA 46, AM 36; PA, outer: 64, inner: 68; minor setae: aa 28, am 14; pm i: 14, ii: 40, iii: 16. Mesothorax, width: 242; metathorax, width: 216. Fore wings, width at base: 86, middle: 50; veins chaetotaxy, fore: 20, hind 13. Abdomen; width at segment IV: 310. Tergite IX setae, IX i: 112, IX ii: 130. Tergite X setae, X i: 128.

**Material examined.** Holotype ♀. MEXICO; VERACRUZ: Volcanic Range, near summit of the Cofre de Perote Vulcano (Nauhcampatépétl), 4100 m.; 20-VI-1982; in *Festuca tolucensis* H.B.K. (Roberto M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella festucavulcanica* sp. nov., are related to those of *F. exiguavulcanoperotensis*, because of the body general morphology, and the pronotum without setae at center. However, in adults of *F. festucavulcanica* the antennal segment III is yellow, and segments IV-V are yellow basally. The tarsi are yellow; the pronotal major anteroangular and anteromarginal setae are shorter than posteromarginal ii. In *F. exiguavulcanoperotensis* adults, antennal segment III is light brown, and IV is light brown

basally. All tarsi are light brown. The pronotal major anteroangular and anteromarginal setae are subequal in length to posteromarginal ii.

**Derivatio nominis:** *festuca* = a montane grass, *vulcanica* = vulcano related.

***Frankliniella jaroslavpelikani* sp. nov.**

(Figs. 59, 69-70, 88-89, 93-94)

**Female.** Body color typical, except: antennal segments, III yellow; IV yellow in basal one half, the rest darkened with brown. All tarsi light brown. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 59), broader (1.21 times) than long at middle; cheeks sinuouse, broader at middle; occiput sculptured with close parallel striae, confluent at both sides. Antennal segments (Fig. 69), III longer than IV and VI. Mouth-cone almost subequal to head's dorsal length. Pronotum (Fig. 59), broader (1.32 times) than long; almost smooth, except for some faint transverse striae in fore and hind margins; four setae forming a rhombus at center, and two median subposteromarginals. Pterothorax; Mesonotum (Fig. 88); metanotal scutum (Fig. 89). Abdomen; tergite I (Fig. 92); tergites VIII-X (Fig. 93).

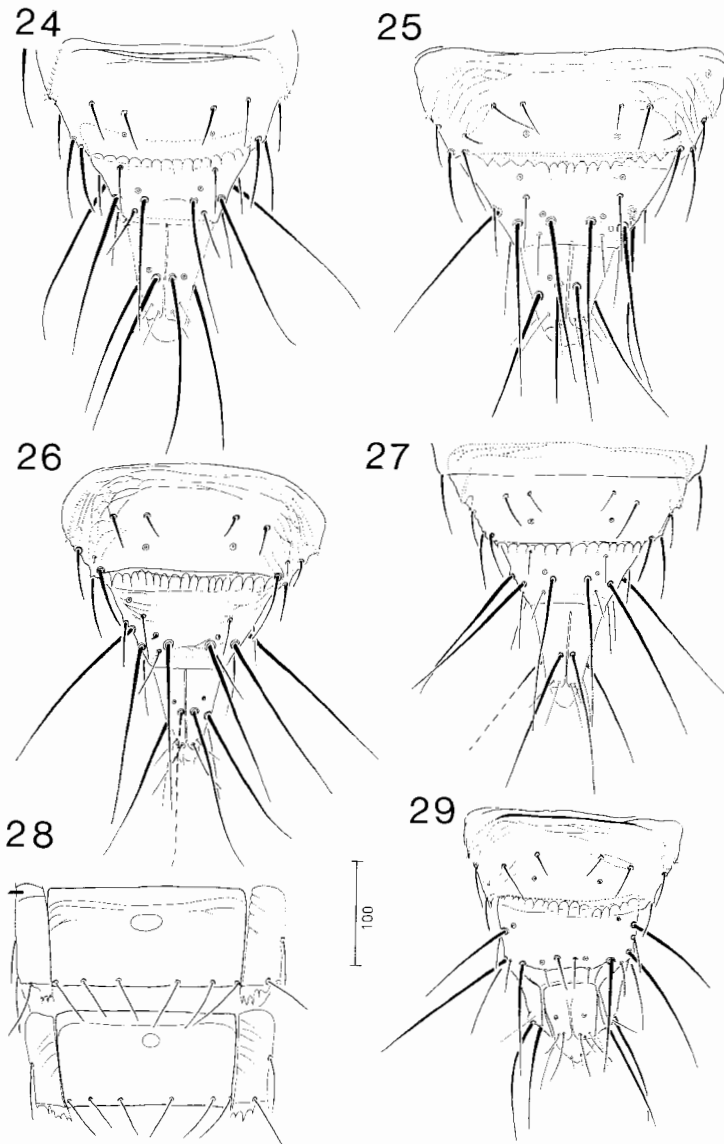
**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.84 mm.

Head dorsal length: 120. Width at eyes: 142, behind eyes: 140, middle: 146, basal: 140. Chaetotaxy, intocc: 62; postoc: ii 16, iii 16, IV 48, v 22. Compound eyes, length: 66, width: 50. Ocelli, fore: 12, hind: 12. Antennal segments, length (width): I 30 (28), II 40 (28), III 58 (24), IV 50 (24), V 36 (20), VI 48 (20), VII 12 (8), VIII 16 (6). Thorax; pronotum, length: 154, width at middle: 204. Chaetotaxy, major setae: AA 74, AM 46; PA, outer: 76, inner: 84; minor setae: aa 30, am 12; pm i: 18, ii: 42, iii: 14, Mesothorax, width: 290; metathorax, width: 260. Fore wings, width at base: 110, middle: 70; veins chaetotaxy, fore: 24, hind: 17. Abdomen; width at segment IV: 328. Tergite IX setae, IX i: 142, IX ii: 154. Tergite X setae, X i: 142.

**Material examined.** Holotype ♀. MEXICO; DISTRITO FEDERAL: Sierra de Ajusco (Volcanic Range), km 42 on road Méx-95 Mexico City-Cuernavaca, 3000 m.; 24-I-1987; in shrubs of *Senecio* sp. and *Bacharis* sp. within *Pinus* Forest (Roberto M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella jaroslavpelikani* sp. nov., are related to those of *F. axochcoensis* and *F. nauhcampatepetlensis*. However, they are different because in *F. jaroslavpelikani* the pronotum bears four setae at center (only two in *F. axochcoensis* and *F. nauhcampatepetlensis*). There are also differences in the metanotal scutum sculpture.

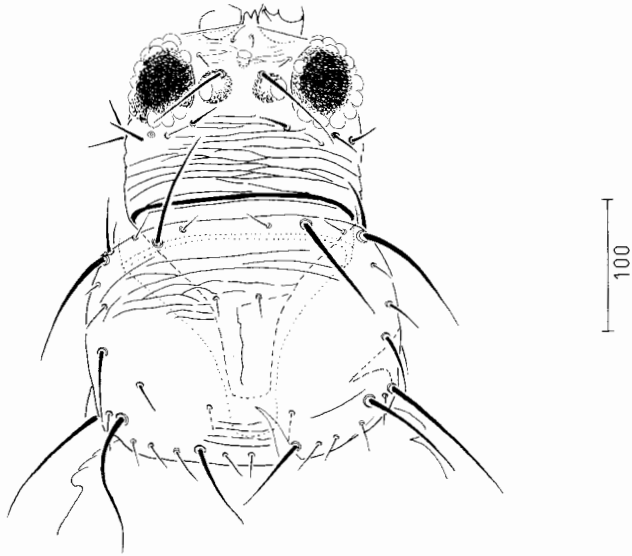
**Derivatio nominis:** this species is named honouring Dr. Jaroslav Pelikani, from Brno, Czech Republic, as a tribute of friendship.



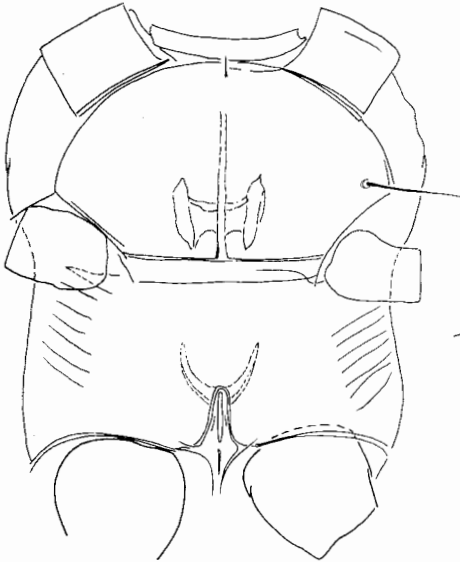
Figures 24-29

Dorsal views of segments VIII-X, and ventral view of male sternites VI-VII with glandular areas, from *Frankliniella* spp. 24. *axochcoensis* sp. nov. Holotype ♀. 25. *carmenmendietae* sp. nov. Holotype ♀. 26. *paricutinensis* sp. nov. Holotype ♀. 27. *copilcoensis* sp. nov. Holotype ♀; 28. *Idem*, Paratype ♂ (sternites VI-VIII); 29. *Idem*, tergites VIII-X. Scale in  $\mu\text{m}$ , same (400 X) for all figures.

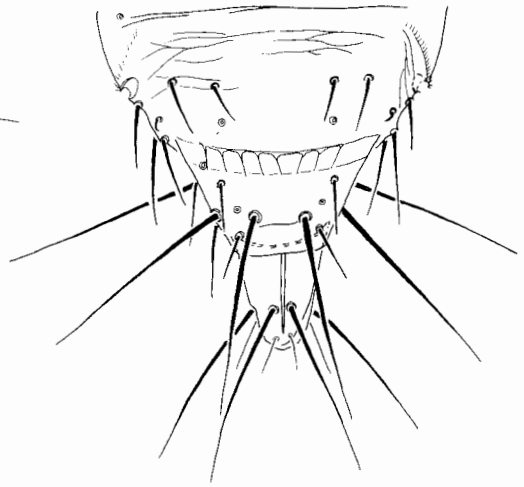
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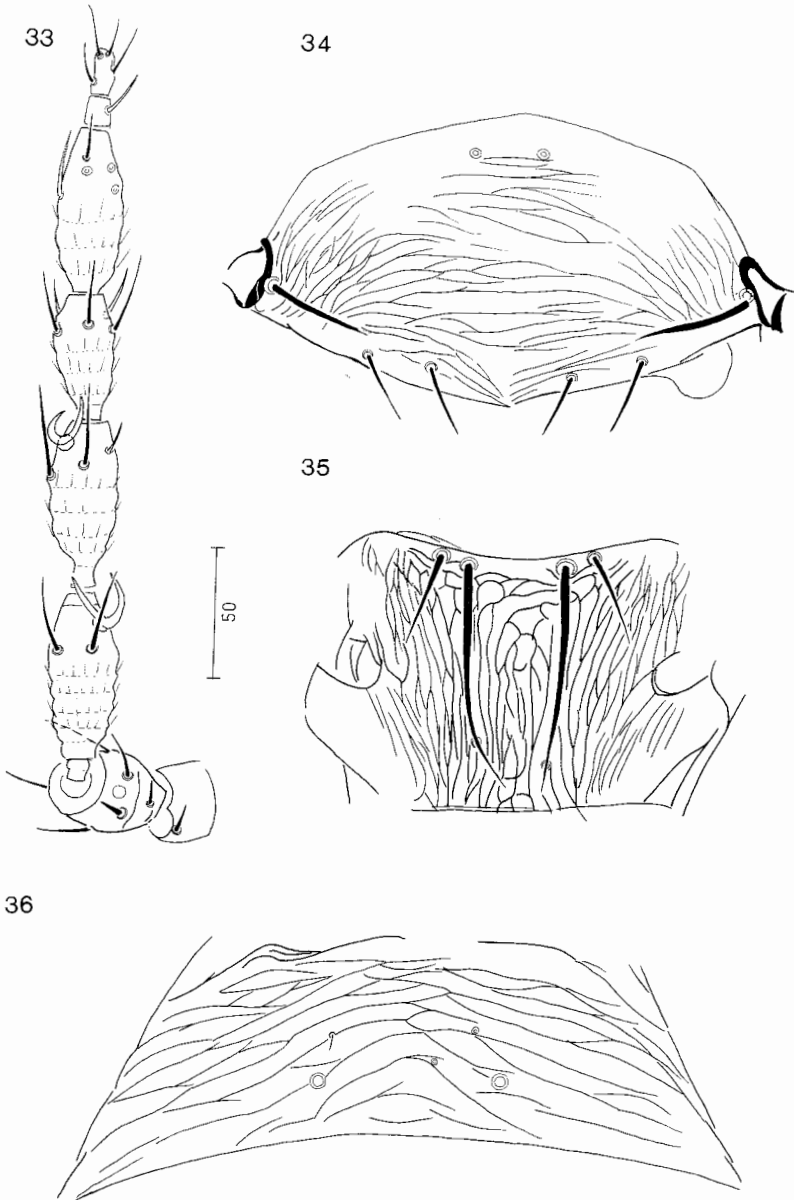


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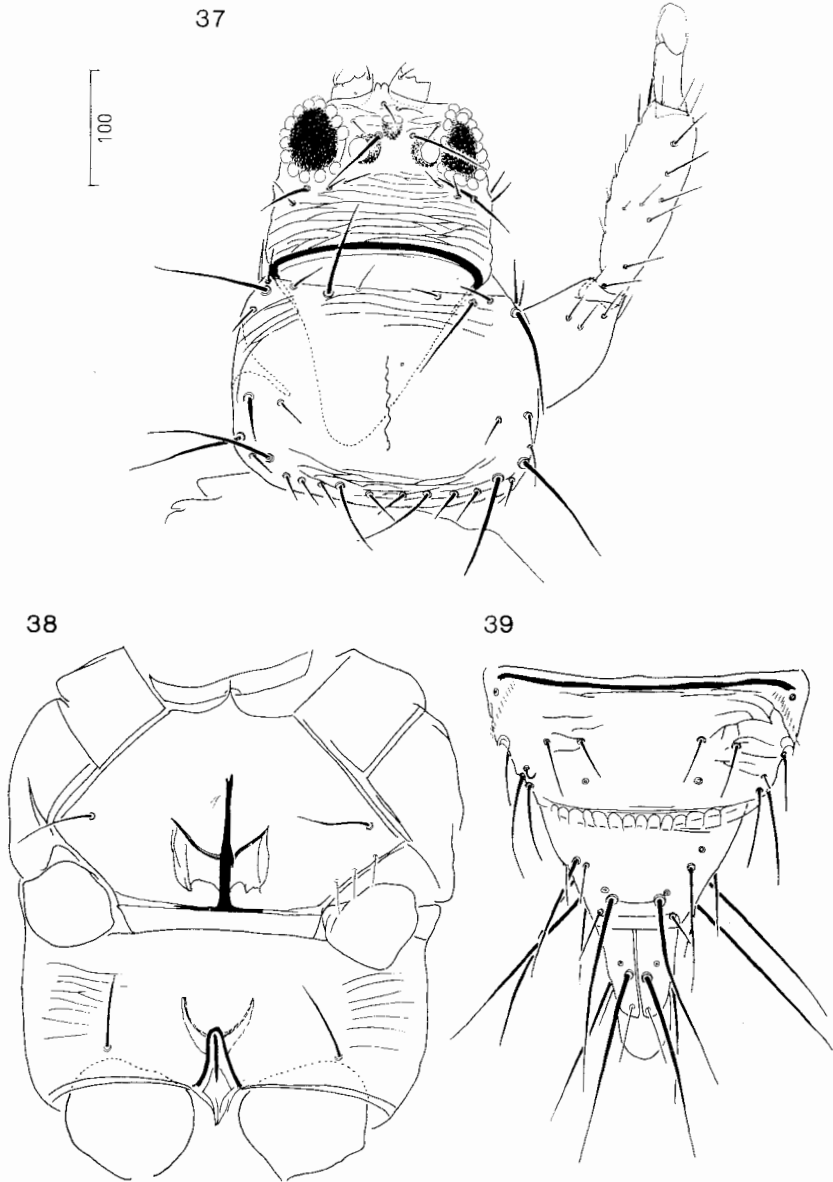
Figures 30-32

Dorsal and ventral views of *Frankliniella vulcanoperotensis* sp. nov. Holotype ♀. 30 Head and pronotum (corrected); 31. Pterosternum (ventral); 32. Tergites VIII-X. Scale in  $\mu\text{m}$ , same (400 X) for all figures.



**Figures 33-36**

Dorsal views of *Frankliniella vulcanoperotensis* sp. nov. Holotype ♀. 33. Right antenna; 34. Mesonotum; 35. Metanotal scutum; 36. Tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.



Figures 37-39

Dorsal and ventral views of *Frankliniella vulcanorizabaensis* sp. nov. Holotype ♀. 37. Head, pronotum and right fore leg; 38. Pterosternum (ventral); 39. Tergites VIII-X. Scale in  $\mu\text{m}$ , same (400 X) for all figures.

***Frankliniella lopezochoterenai* sp. nov.**

(Figs. 44-50, 94)

**Female.** Body color typical, except: antennal segments, II dark chestnut brown, clear in apical half; III yellow; IV yellow in basal one half, the rest dark chestnut brown; V dark chestnut brown, lighter in extreme base. All tibiae dark brown; all tarsi light brown. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 44), broader (1.58 times) than long at middle; cheeks sinuose. Chaetotaxy as follows: antecellar pair I subequal in length to postocular ii-iii. Antennal segments (Fig. 47) typical. Mouth-cone longer than dorsal length of head, and projected on anterior five sixths of prosternum. Pronotum (Fig. 44) broader (1.40 times) than broad at middle. Mesonotum (Fig. 48), metanotal scutum (Fig. 49); pterosternum (Fig. 45). Abdomen; tergite (Fig. 50); tergites VIII-X (Fig. 46).

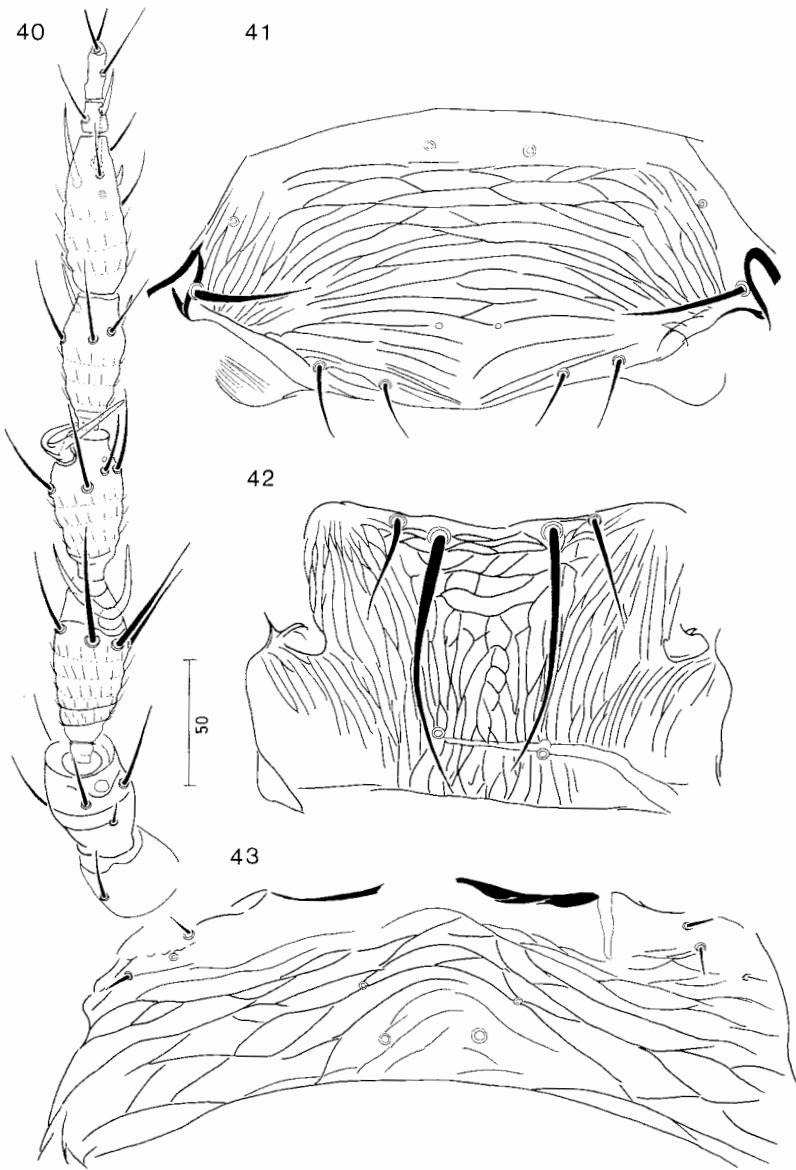
**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.60 mm.

Head dorsal length: 100. Width at eyes: 154, behind eyes: 150, middle: 158, basal: 154. Chaetotaxy, intocc: 54; postoc: ii 18, iii 10, IV 46. Compound eyes, length: 60, width: 46. Ocelli, fore: 12, hind: 12. Antennal segments, length (width): I 26 (28), II 40 (26), III 58 (22), IV 60 (22), V 42 (20), VI 48 (20), VII 12 (8), VIII 16 (6). Thorax; pronotum, length: 152; width at middle: 214. Chaetotaxy, major setae: AA 70, AM 50; PA, outer: 76, inner: 88; minor setae: aa 16; pm i: 20, ii: 46, iii: 14. Mesothorax, width: 292, metathorax, width: 270. Fore wings veins chaetotaxy, fore: 22, hind: 18. Abdomen; width at segment IV: 378. Tergite IX setae, IX i: 140, IX ii: 150. Tergite X setae, X i: 146.

**Material examined.** Holotype ♀, Paratype ♀. MEXICO; MORELOS: Sierra de Tepoztlán, 17 km NE of Cuernavaca, on road Méx.-95; 21-XII-1976; by beating shrubs leaves (Alfonso N. García), in IBUNAM. ESTADO DE MEXICO: Sierra Nevada Iztacihuatl-Popocatepetl (Volcanic Range), km 16 on road to Tlamacas, 3300 m.; 26-IV-1986 (Paratype ♀), in flowers of *Senecio salignus* within *Pinus* Forest (Roberto M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella lopezochoterenai* sp. nov., are similar to those of *F. paricutinensis*. However, in *F. lopezochoterenai* the postocular setae ii and iii are subequal in length, and the mesosternal plate has both anterolateral sides subequal to both posterolaterals; whereas in *F. paricutinensis* the postocular setae ii are longer and stouter than iii or v, and the mesosternal plate has both anteromarginal sides much longer than the posteromarginals.

**Derivatio nominis:** this species is named honouring the Mexican Protozoologist Dr. Eucario López-Ochoterena, as a tribute of friendship.

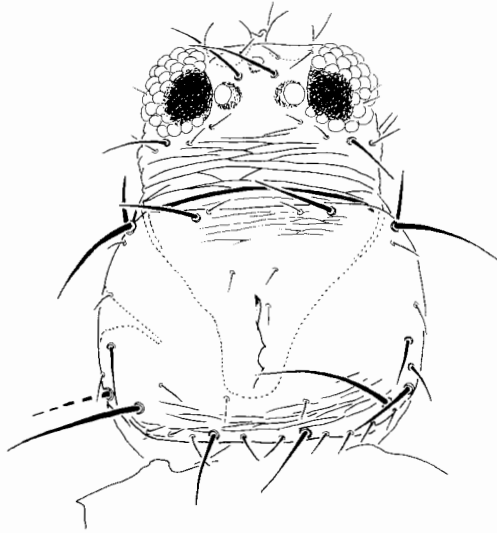


Figures 40-43

Dorsal views of *Frankliniella vulcanorizabaensis* sp. nov. Holotype ♀. 40. Right antenna; 41. Mesonotum; 42. Metanotal scutum; 43. Tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.

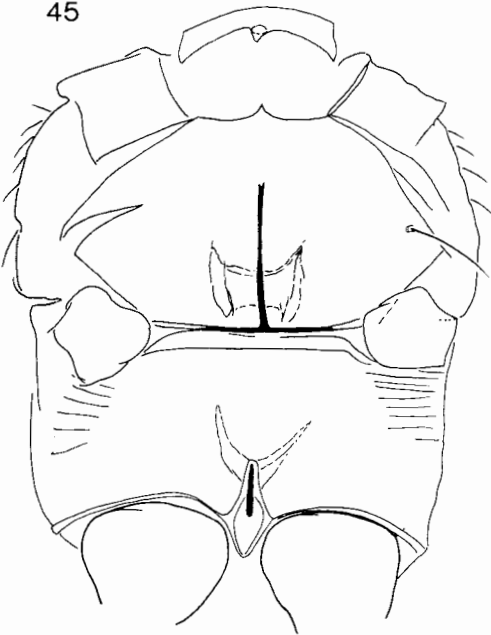


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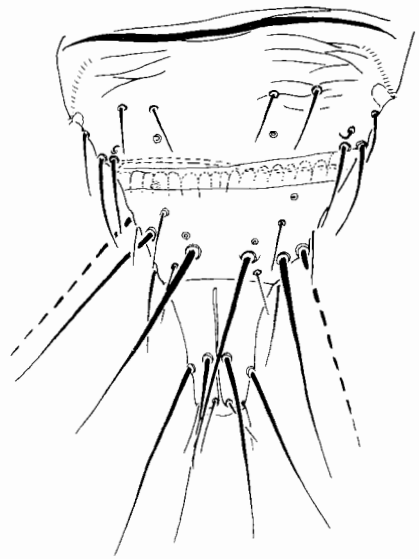


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45



46



Figures 44-46

Dorsal and ventral views of *Frankliniella lopezochoterenai* sp. nov. Holotype ♀. 44. Head and pronotum; 45. Prosternum (ventral); 46. Tergites VIII-X. Scale in  $\mu\text{m}$ , same (400 X) for all figures.

*Frankliniella nauhcampatepetlensis* sp. nov.  
(Figs. 61-62, 76-80, 94)

**Female.** Body color typical, except: antennal segments, III yellowish-brown in basal two thirds, dark brown in apical one third; IV yellowish-brown. Fore tibiae yellowish-brown. All tarsi yellowish-brown. Ocellar crescents crimson red.

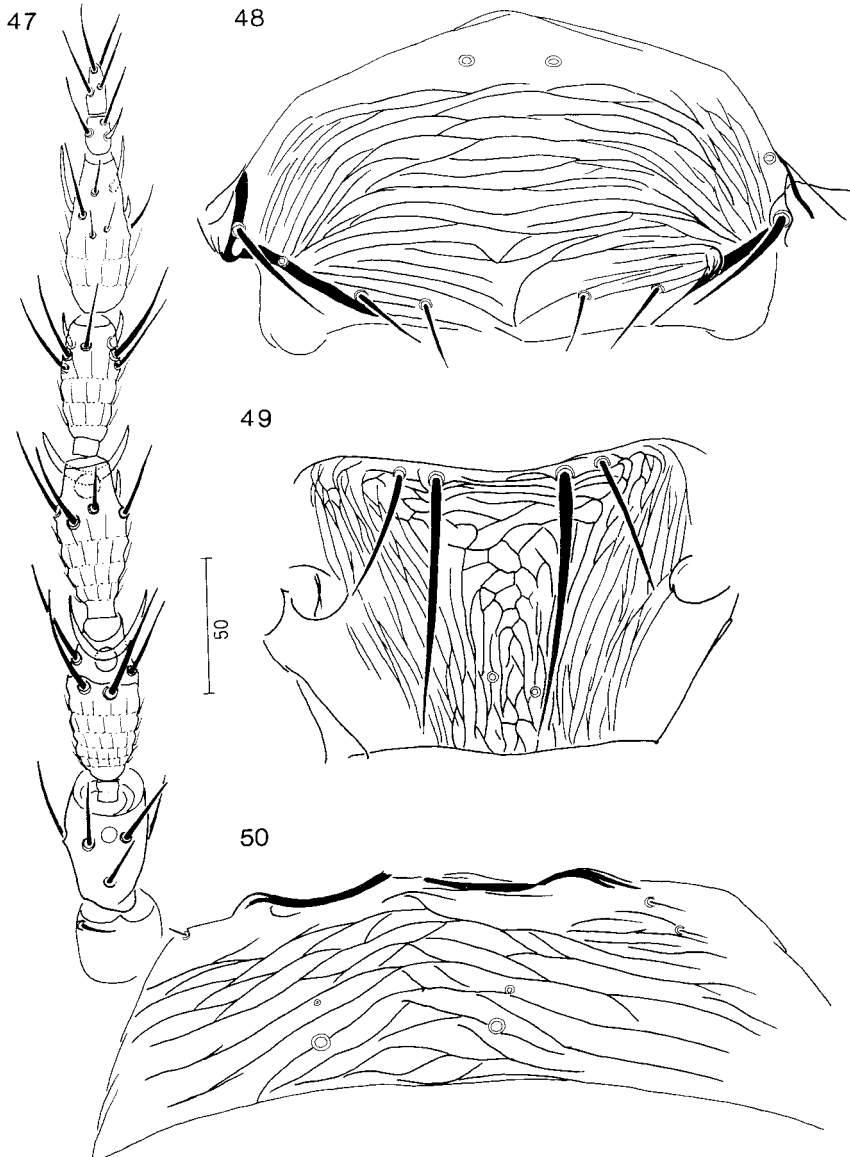
**Morphology.** Head in dorsal aspect (Fig. 61), broader (1.36 times) than long at middle; cheeks sinuose, broader at middle; occiput sculptured with close parallel striae, confluent at center and both sides. Antennal segments (Fig. 76), III longer than IV and VI. Mouth-cone shorter than head's dorsal length. Pronotum (Fig. 61), broader (1.53 times) than long at middle; almost smooth, but with some striae in anterior margin; with a setae pair at center, and another pair of median subposteromarginals. Pterothorax; mesonotum (Fig. 77); metanotal scutum (Fig. 78). Abdomen; tergite I (Fig. 79); tergites VIII-X (Fig. 80).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.82 mm.

Head dorsal length: 104. Width at eyes: 140, behind eyes: 138, middle: 146, basal: 140. Chaetotaxy, intocc: 50; postoc: ii 12, iii 13, IV 40, v 22. Compound eyes, length: 60, width: 54. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 32 (26), II 40 (26), III 58 (22), IV 46 (20), V 40 (20), VI 48 (18), VII 10 (8), VIII 16 (6). Thorax; pronotum, length: 150, width at middle: 204. Chaetotaxy, major setae: AA 60, AM 46; PA, outer: 80, inner: 72; minor setae: aa 30, am 16; pm i: 16, ii: 38, iii: 16. Mesothorax, width: 298; metathorax, width: 262. Fore wings, width at base: 110, middle: 64; veins chaetotaxy, fore: 22, hind: 17. Abdomen; width at segment IV: 330. Tergite IX setae, IX i: 130, IX ii: 140. Tergite X setae, X i: 138.

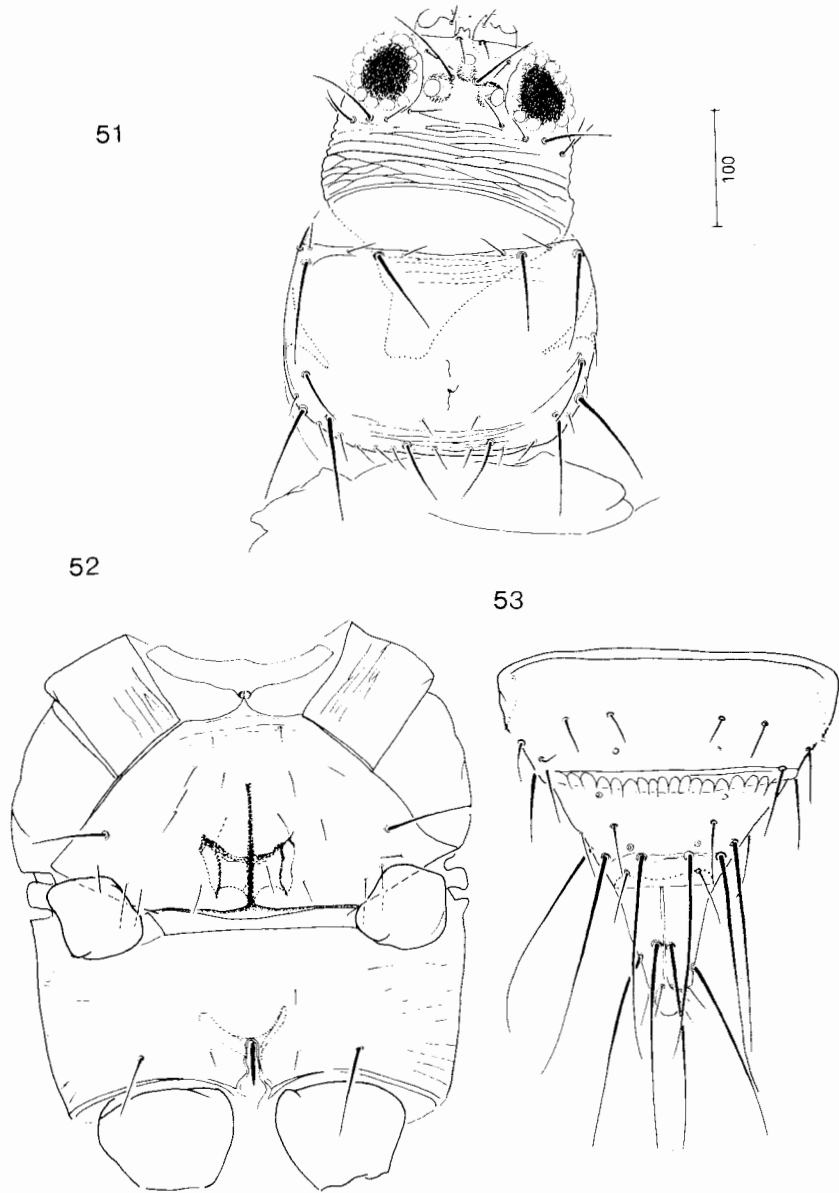
**Material examined.** Holotype ♀, Paratype ♀. MEXICO; VERACRUZ: Volcanic Range, North West source of the Cofre de Perote (Nauhcampatépetl) Vulcano, 2280 m.; 8-V-1982 (Holotype ♀, in *Stipa* sp. grass within *Pinus* Forest (Roberto M. Johansen & Aurea Mojica-Guzmán), in IBUNAM. DISTRITO FEDERAL: Tlalpan, Sierra de Ajusco (Volcanic Range), km 26 on road to Toluca, 3500 m.; 17-IV-1994 (Paratype ♀), in flowers of *Senecio salignus* within *Pinus* Forest (Martha Ortega), in IBUNAM.

**Comments.** Adults of *Frankliniella nauhcampatepetlensis* sp. nov., are related to those of *F. axochcoensis* (see comments). However, they are different as follows: in *F. nauhcampatepetlensis*, the antennal segment III is yellowish brown basally, IV is yellowish brown basally; the interocellar setae are longer than the compound eyes width, and postocular setae IV; mouth-cone is shorter than head's dorsal length. In *F. axochcoensis*, the antennal segments III-IV are yellow basally and dark brown apically; V-VI each with a clear sub-basal ring; interocellar setae are shorter than compound eyes width, and postocular setae IV; mouth-cone is subequal to head's dorsal length.



Figures 47-50

Dorsal views of *Frankliniella lopezochoterenai* sp. nov. Holotype ♀. 47. Right antenna; 48. Mesonotum; 49. Metanotal scutum; 50. Tergite I. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.



Figures 51-53

Dorsal and ventral views of *Frankliniella vulcanotolucensis* sp. nov. Holotype ♀. 51. Head and pronotum; 52. Pterosternum (ventral); 53 Tergites VIII-X. Scale in  $\mu\text{m}$ , same (400 X) for all figures.

**Derivatio nominis:** from Náhuatl, nauhcampatépetl, nauhcampa = square thing, with four corners or four parts, tépetl = mountain; squared mountain. From Latin, ensis = locative.

***Frankliniella paricutinensis* sp. nov.**

(Figs. 3, 8, 16-19, 23, 94)

**Female.** Body color typical, except: antennal segments, III yellow, brown in apical one fourth; IV yellow in basal one half, with two brownish sub-basal rings; V dark brown with a clear sub-basal ring. Fore tibiae yellow in apical end. All tarsi yellowish-brown.

**Morphology.** Head in dorsal aspect (Fig. 3), broader (1.52 times) than long at middle; cheeks sinuose; occiput sculptured with transverse, parallel and confluent striae. Chaetotaxy as follows: interocellars (pair III) longer than eyes and subequal or longer than pronotal major anteromarginal setae; postocular ii longer and stouter than iii. Antennal segments (Fig. 16): III longest; IV and VI subequal in length. Mouth-cone longer than dorsal length of head. Pronotum (Fig. 3) almost smooth, with faint transverse and close striae in anterior one third, and some strong transverse striae in posterior margin; chaetotaxy as follows: major anteroangulars longer than anteromarginals, but shorter than posteroangulars; two minor median subposteromarginals. Pterothorax; mesonotum (Fig. 17), with open and transverse reticulation; metanotal scutum (Fig. 18); pterosternum (Fig. 8); mesosternal plate with anterolateral sides longer than posterolaterals; mesofurca and spinula strong. Tergite I (Fig. 18); tergites VIII-X (Fig. 26).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.62 mm.

Head dorsal length: 110. Width at eyes: 154, behind eyes: 154, middle: 168, basal: 162. Chaetotaxy, intocc: 62; postoc: ii 26, iii 16, IV 50. Compound eyes, length: 60, width: 40. Ocelli, fore: 12, hind: 16. Antennal segments; length (width): I 30 (30), II 40 (26), III 54 (22), IV 50 (22), V 40 (18), VI 50 (20), VII 12 (8), VIII 18 (6). Thorax; pronotum, length: 160; width at middle: 216. Chaetotaxy, major setae: AA 56, AM 52; PA, outer: 90, inner: 90; minor setae: aa 34, am 20; pm i 20, ii 50, iii 16. Mesothorax, width: 62; metathorax, width: 68. Fore wings, width at base: 100, middle: 68; veins chaetotaxy, fore: 20, hind: 18. Abdomen: width at segment IV: 350. Tergite IX setae, X i: 146, X ii: 160. Tergite X setae, X i: 140.

**Male.** Virtually like adult female. Antennal segments, III yellow in basal two thirds, brown in apical one third; IV yellow in basal one half, brown in apical one half; V light brown in extreme base, the rest dark brown. All tarsi yellow.

**Measurements** (Paratype ♂ in  $\mu\text{m}$ ). Body length: 1.49 mm.

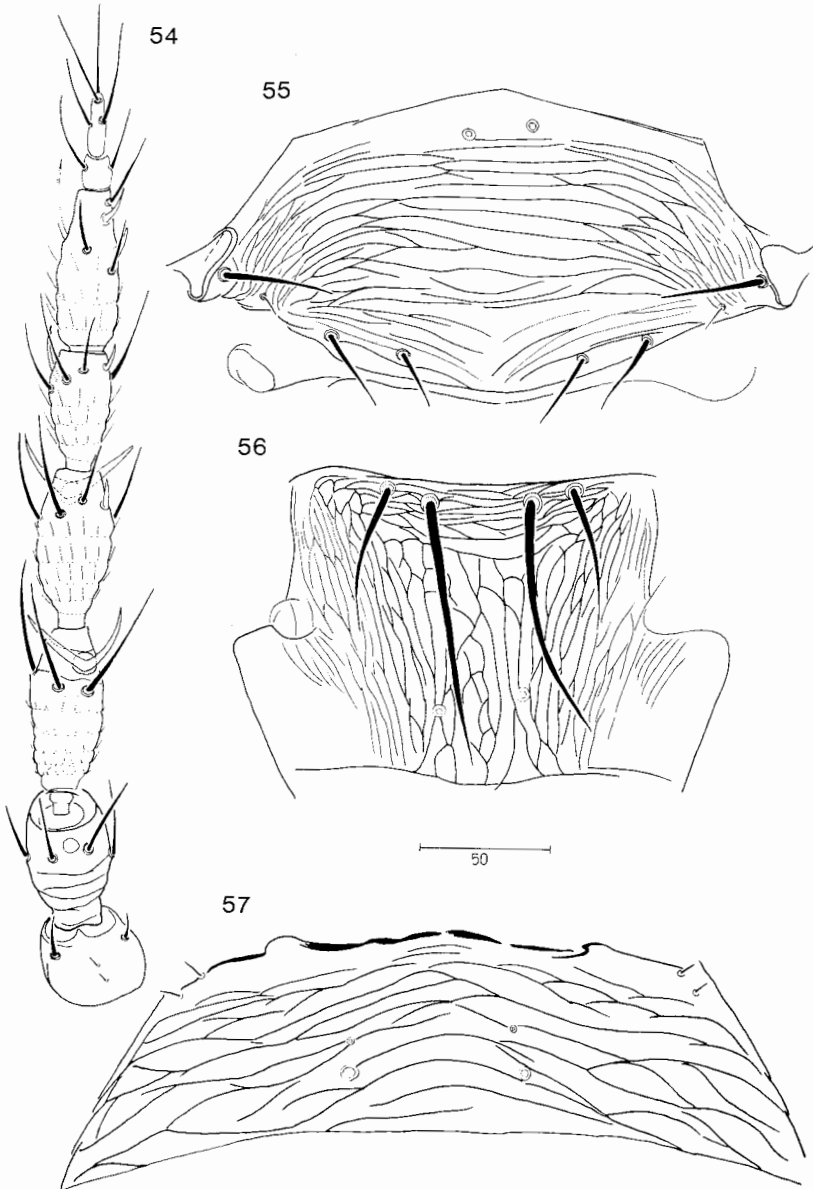
Head dorsal length: 102. Width at eyes: 142, behind eyes: 140, middle: 146, basal: 138. Chaetotaxy, intocc: 54; postoc: ii 18, iii 12, IV 44, v 16. Compound eyes, length: 56, width: 46. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 24 (26), II 36

(24), III 50 (20), IV 42 (20), V 34 (18), VI 42 (16), VII 10 (6), VIII 14 (4). Thorax; pronotum, length: 124, width at middle: 186. Chaetotaxy, major setae: AA 76, AM 46; PA, outer: 60, inner: 72; minor setae: aa 30, am 16; pm i: 14, ii 46, iii 14. Mesothorax, width: 264; metathorax, width: 200. Fore wings, width at base: 96, middle: 56; veins chaetotaxy, fore: 21, hind: 17. Abdomen; width at segment IV: 214. Tergite IX setae, IX i: 32, IX ii: 98. Tergite X setae, X i: 110.

**Material examined.** Holotype ♀; paratypes: 10 ♀♀, 2 ♂♂. MEXICO; MICHOACAN: (Volcanic Range), 5 km N of Paricutín Volcano, 2190 m.; 2-XII-1991; (Holotype ♀), in *Muhlenbergia* sp. grass (Roberto M. Johansen & Aurea Mojica-Guzmán), in IBUNAM. ESTADO DE MEXICO: Sierra Nevada Iztacihuatl-Popocatepetl (Volcanic Range), km 16 on road to Tlamacas, 3300 m.; 26-X-1985 (Paratype ♂) in *Muhlenbergia macroura* within *Pinus* Forest (María Luisa Montes de Oca & R.M. Johansen), in IBUNAM; *Idem et Ibidem*, 23-XI-1985 (Paratype ♀), in *Muhlenbergia macroura* within *Pinus* Forest (Ma. Luisa Montes de Oca & R.M. Johansen), in IBUNAM. *Idem*, km 14 on road to the Nevado de Toluca Volcano (Volcanic Range), 3680 m.; 25-I-1987 (Paratype ♀), in flowers of *Senecio salignus* within *Pinus* Forest (R.M. Johansen), in IBUNAM. DISTRITO FEDERAL: Sierra de Ajusco (Volcanic Range), km 42 on road Méx-95 México City-Cuernavaca, 3000 m.; 24-I-1987 (paratypes: 5 ♀♀) in *Bacharis* and *Senecio* shrubs within *Pinus* Forest (R.M. Johansen), in IBUNAM; *Idem et Ibidem*, 20-III-1987 (Paratype ♀), in flowers of *Senecio salignus* within *Pinus* Forest (R.M. Johansen), in IBUNAM; *Idem et Ibidem*, 30-X-1987 (Paratype ♂), in *Muhlenbergia* sp. within *Pinus* Forest (R.M. Johansen), in IBUNAM; *Idem et Ibidem*, 21-XI-1987 (paratypes: 2 ♀♀), in *Muhlenbergia* sp. within *Pinus* Forest (R.M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella paricutinensis* sp. nov., are related to those of *F. carmenmendietae*, because both share the following characters: the pronotal median transverse setae row, the subposteromarginal median setae pair, and the mesosternal plate general outline. However, they are different because in *F. paricutinensis* the anteocellar setae (pairs I-II) are shorter than postocular ii; the pronotal posteromarginal setae ii are 2.5 times longer and more stout than i; the mesonotum has the transverse striae more open at center; the metanotal scutum has more equiangular polygonal reticulation in anterior one third, whereas in *F. carmenmendietae* the anteocellar setae (pairs I-II) are longer and stouter than postocular ii; the pronotal posteromarginal setae ii are shorter: 2.0 times longer than i; the mesonotum has closer transverse striae at center; the metanotal scutum has only transverse elongate polygonal reticulation.

**Derivatio nominis:** from the Phorhépecha language of Michoacán, México: parhíkutini= on the other side, the name of a famous Volcano, which destroyed a town with the same name in 1943, according to Velazquez-Gallardo (1988).



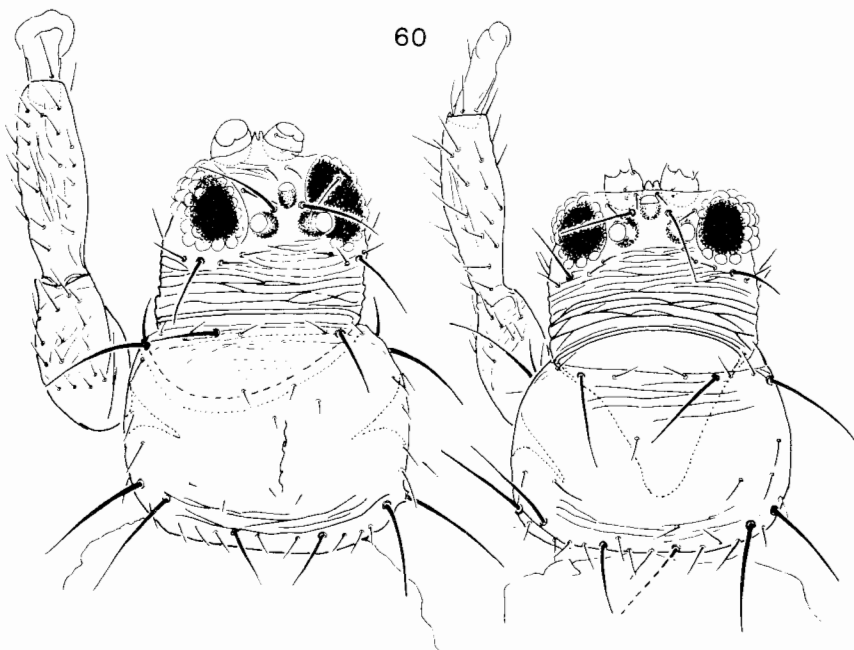
Figures 54-57

Dorsal views of *Frankliniella vulcanotolucensis* sp. nov. Holotype ♀. 54. Right antenna; 55. Mesonotum; 56. Metanotal scutum; 57. Tergite. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.

58



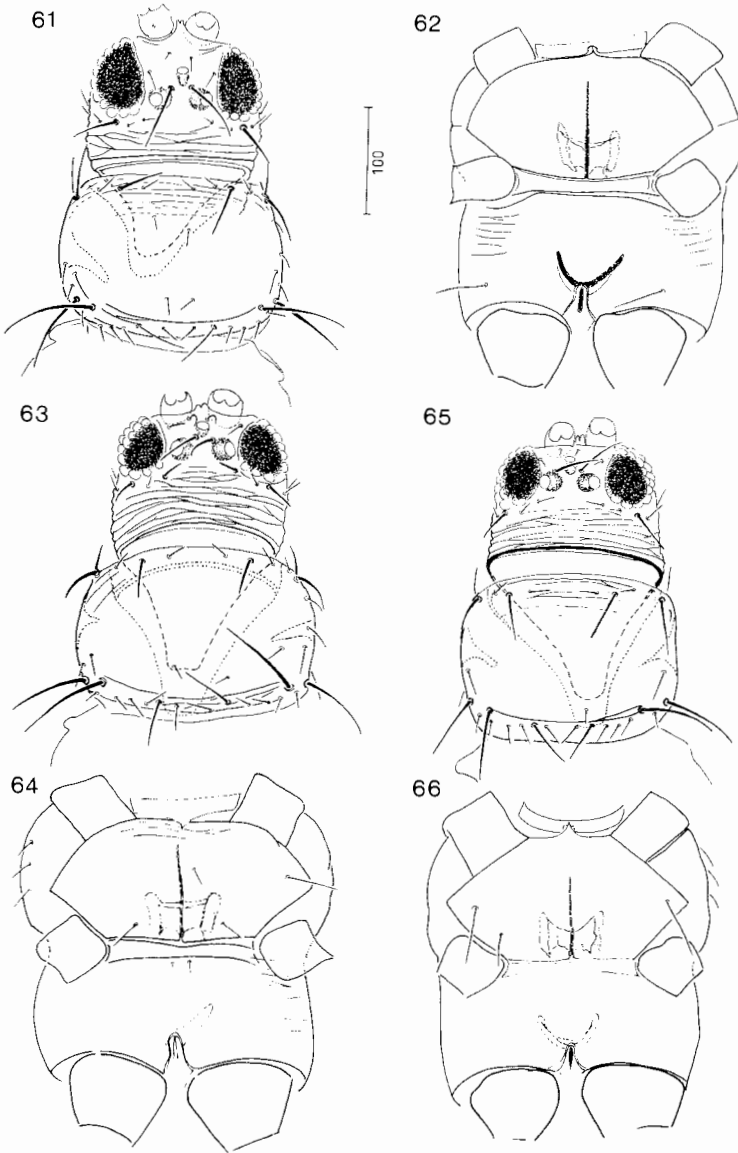
59



Figures 58-60

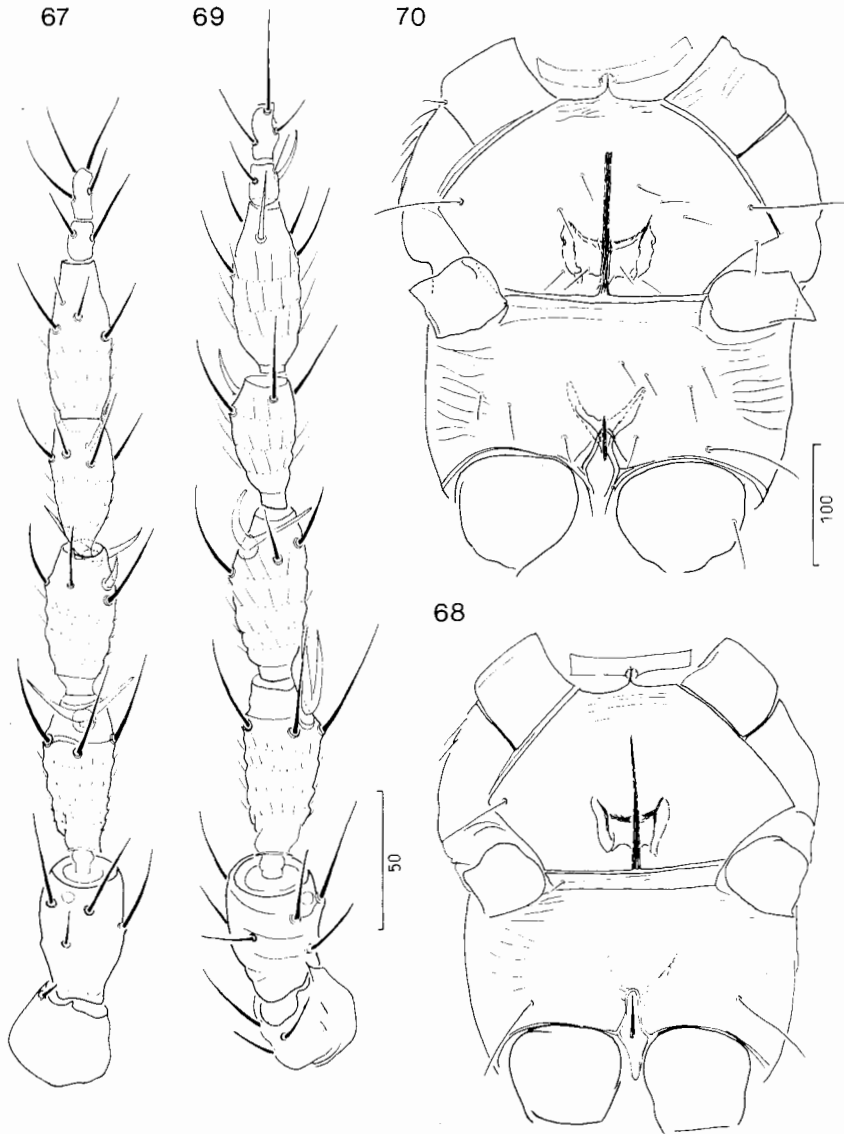
Dorsal views of *Frankliniella* spp. head and pronotum. 58. *popocatepetlensis* sp. nov. Holotype ♀ (with right fore leg). 59. *jaroslavpelikani* sp. nov. Holotype ♀ (with right fore leg). 60. *carmenmendietae* sp. nov. Paratype ♂ (with left fore leg). Scale in  $\mu\text{m}$ , same (400 X) for all figures.





Figures 61-66

Dorsal and ventral views of *Frankliniella* spp. 61. *nauhcampatepetlensis* sp. nov. Holotype ♀ head and pronotum (corrected); 62. *Idem*, pterosternum (ventral). 63. *festucavulcanica* sp. nov. Holotype ♀ head and pronotum (corrected), 64. *Idem*; pterosternum (ventral). 65. *exiguavulcanoperotensis* sp. nov. Holotype ♀ head and pronotum (corrected); 66. *Idem*, pterosternum (ventral). Scale in  $\mu\text{m}$ , same (400 X) for all figures.



Figures 67-70

Dorsal and ventral views of *Frankliniella* spp. 67. *popocatepetlensis* sp. nov. Holotype ♀ right antenna, 68. *Idem*, pterosternum (ventral). 69. *jaroslavpelikani* sp. nov. Holotype ♀ right antenna; 70. *Idem*, pterosternum (ventral). Scales in µm, same (400 X) for figures 68, 70; same (1000 X) for figures 67, 69.

***Frankliniella popocatepetlensis* sp. nov.**

(Figs. 58, 67-68, 86-87, 90-91, 94)

**Female.** Body color typical, except: antennal segments, III yellow in basal one third, the rest dark brown; IV light brown in basal one third, dark brown; V dark brown, with a lighter sub-basal ring. Fore tibiae yellowish-brown. Fore tarsi yellow; median and hind tarsi light brown. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 58), broader (1.72 times) than long at middle; cheeks slightly sinuose, broader at eyes and middle; occiput sculptured with close parallel striae, confluent at middle and both sides. Antennal segments (Fig. 67), III longer than IV and VI. Mouth-cone longer than head's dorsal length. Pronotum (Fig. 58), almost smooth, but with some faint transverse striae in anterior one third and near posterior margin; with four setae forming an open curve at center, and with a median pair of subposteromarginals. Pterothorax; mesonotum (Fig. 86); metanotal scutum (Fig. 87). Abdomen; tergite I (Fig. 90); tergites VIII-X (Fig. 91).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.62 mm.

Head dorsal length: 86. Width at eyes: 146, behind eyes: 142, middle: 148, basal: 140. Chaetotaxy, intocc: 50; postoc: ii 20, iii 12, IV 42, v 16. Compound eyes, length: 50, width: 40. Ocelli, fore: 12, hind: 10. Antennal segments, length (width): I 28 (28), II 40 (24), III 54 (22), IV 44 (22), V 38 (18), VI 50 (18), VII 10 (8), VIII 14 (6). Thorax; pronotum, length: 156, width at middle: 200. Chaetotaxy, major setae: AA 62, AM 58; PA, outer: 80, inner: 76; minor setae: aa 28, am 16; pm i: 16, ii: 36, iii: 16. Mesothorax, width: 268; metathorax; width: 238. Fore wings, width at base: 102, middle: 60; veins chaetotaxy, fore: 25, hind: 16. Abdomen; width at segment IV: 280. Tergite IX setae, IX i: 126, IX ii: 142. Tergite X setae, X i: 130.

**Material examined.** Holotype ♀. MEXICO; ESTADO DE MEXICO: Sierra Nevada Iztacihuatl-Popocatepetl (Volcanic Range), km 16 on road to Tlamacas, 3300 m.; 26-X-1985; in *Muhlenbergia macroura* within *Pinus* Forest (María Luisa Montes de Oca & Roberto M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella popocatepetlensis* sp. nov., are related to those of *F. carmenmendietae*. However, they are different in the following characters: in *F. popocatepetlensis* the pronotum has four setae forming an open curve at center; the metanotal scutum has some close transverse polygons in anterior one sixth, and by large equiangular polygons, followed by elongate reticulation in posterior one half, but with some equiangular polygons at base in *F. carmenmendietae*, the pronotum has one setae at center; the metanotal scutum is sculptured with transverse polygons in anterior one third, followed by elongate reticulation in posterior two thirds.

**Derivatio nominis:** from Náhuatl, popoca - tépetl: popoca = to smoke, tépetl = mountain, the smoking mountain, according to Macazaga-Ordoño (1979).

***Frankliniella vulcanorizabaensis* sp. nov.**

(Figs. 37-43, 94)

**Female.** Body color typical, except: antennal segments, III yellow; IV yellow in basal one third, the rest dark chestnut brown; V dark chestnut brown, lighter in extreme base. All tibiae brown. All tarsi yellow. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 37), broader (1.38 times) than long at middle; cheeks slightly sinuouse. Chaetotaxy as follows: antecellar setae (pair I) longer than those of pair II, and subequal in length to postocular ii-iii. Antennal segments (Fig. 40) typical. Mouth-cone longer than head's dorsal length, and projected on anterior four fifths of prosternum. Pronotum (Fig. 37) broader (1.43 times) than long at middle. Mesonotum (Fig. 41); metanotal scutum (Fig. 42); pterosternum (Fig. 38). Abdomen; tergite I (Fig. 43); tergites VIII-X (Fig. 39).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.39 mm.

Head dorsal length: 118. Width at eyes: 154, behind eyes: 156, middle: 164, basal: 160. Chaetotaxy, intocc: 60; postoc: ii 18, iii 16, IV 42. Compound eyes, length: 64, width: 50. Ocelli, fore: 14, hind: 16. Antennal segments, length (width): I 30 (32), II 38 (26), III 60 (24), IV 48 (24), V 46 (20), VI 50 (20), VII 12 (8), VIII 16 (6). Thorax; pronotum, length: 160; width at middle: 230. Chaetotaxy as follows: major setae: AA 80, AM 66; pm, outer: 90, inner: 94; minor setae: aa 32, am 22; pm i: 20, ii: 54, iii: 20. Mesothorax, width: 360; metathorax, width: 333. Fore wings, width at base: 104, middle: 60; veins chaetotaxy, fore: 21, hind: 17. Abdomen; width at segment IV: 378. Tergite IX setae, IX i: 150, IX ii: 148. Tergite X setae, X i: 146.

**Male.** Virtually like adult female, except: antennal segments, III yellow in basal one half, the rest dark brown; IV yellowish-brown in extreme base, the rest dark brown. All tarsi light brown.

**Measurements** (Paratype ♂ in  $\mu\text{m}$ ). Body length: 1.21 mm.

Head dorsal length: 92. Width at eyes: 128, behind eyes: 132, middle: 148, basal: 148. Chaetotaxy, intocc: 52; postoc: ii 28, iii 12, IV 40, v 16. Compound eyes, length: 52, width: 40. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 22 (24), II 36 (22), III 48 (18), IV 40 (18), V 34 (16), VI 46 (16), VII 10 (8), VIII 12 (4). Thorax; pronotum, length: 128, width at middle: 180. Chaetotaxy, major setae: AA 60, AM 52; PA, outer: 58, inner: 64; minor setae: aa 24, am 12; pm i: 14, ii: 30, iii: 14. Mesothorax, width: 230; metathorax, width: 216. Fore wings, width at base: 80, middle: 48; veins chaetotaxy,

fore: 20, hind: 14. Abdomen; width at segment IV: 228. Tergite IX setae, IX i: 34, IX ii: 32. Tergite X setae, X i: 110.

**Material examined.** Holotype ♀; paratypes: 2 ♀♀, 1 ♂. MEXICO; VERACRUZ: Sierra Madre Oriental-Volcanic Range, km 124 on road Méx-150, 1990 m.; 21-I-1997 (Holotype ♀, Paratype ♀), by beating herbaceous within *Quercus-Pinus* Forest (Ernesto Barrera), in IBUNAM. ESTADO DE MEXICO: Sierra de Ajusco (Volcanic Range), km 44 on road Méx-142 Xochimilco-Oaxtepec, 2680 m.; 3-X-1985 (Paratype ♀), in *Muhlenbergia macroura* within *Pinus-Quercus* Forest (María Luisa Montes de Oca & Roberto M. Johansen, in IBUNAM; *Idem*, Volcanic Range, on road to the Nevado de Toluca Volcano, 3480 m.; (Paratype ♂), in *Muhlenbergia* sp. within *Pinus* Forest (María Luisa Montes de Oca & Roberto M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella vulcanorizabaensis* sp. nov., are related to those of the species lacking pronotal setae at center: *F. exiguavulcanoperotensis*, *F. festucavulcanica*, and *F. vulcanotolucensis*. However, *F. vulcanorizabaensis* is different because it lacks any pronotal subposteromarginal setae.

**Derivatio nominis:** from Latin, vulcano = volcano. From Náhuatl, Orizaba, a city and a near volcano (Aulizaba, Aulicaba, Ulizaba, Olizaba), Ahuiliz-apan, ahuilizita = to expend wastefully the wealth, apan = river; "the place of ruined man, because of wastefully expend". From Latin, ensis = locative. From the Pico de Orizaba Volcano.

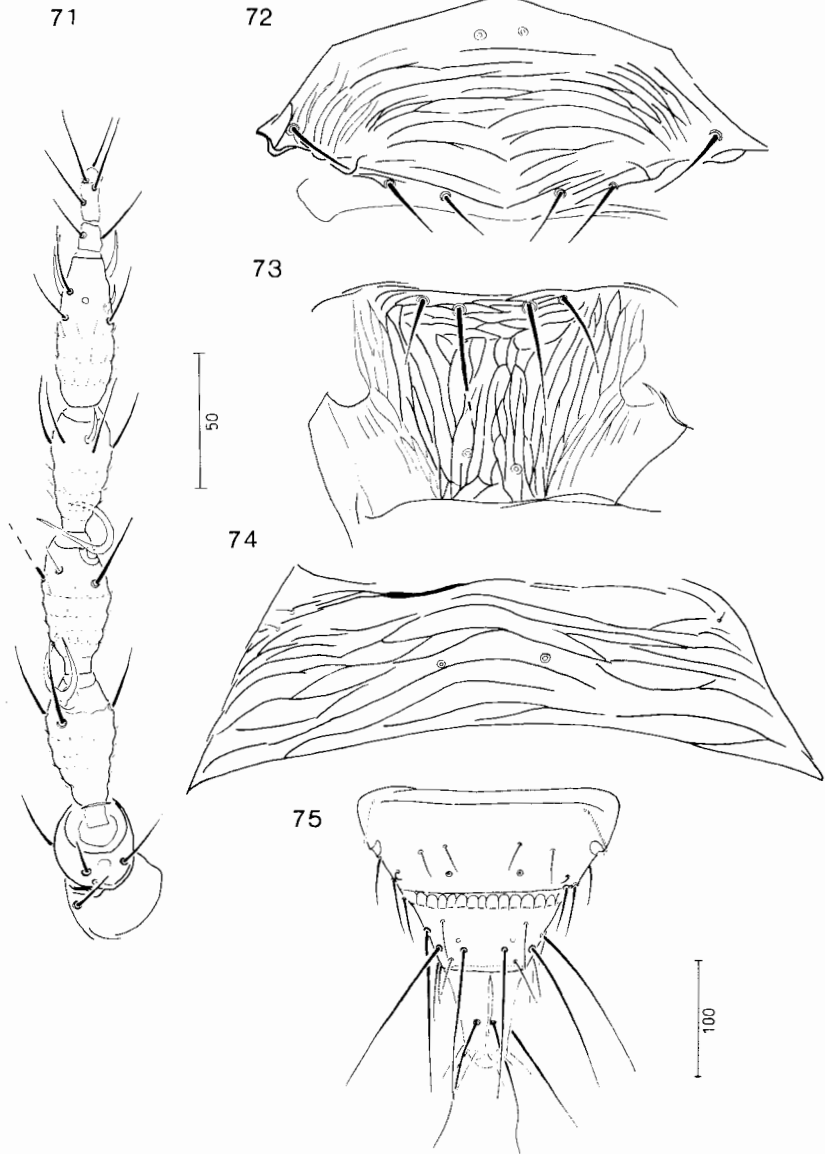
***Frankliniella vulcanoperotensis* sp. nov.**

(Figs. 30-36, 94)

**Female.** Body color typical, except: antennal segments, III yellow; IV yellow in basal one half, the rest dark brown. Fore tibiae yellowish-brown. All tarsi yellow. Ocellar crescents crimson red.

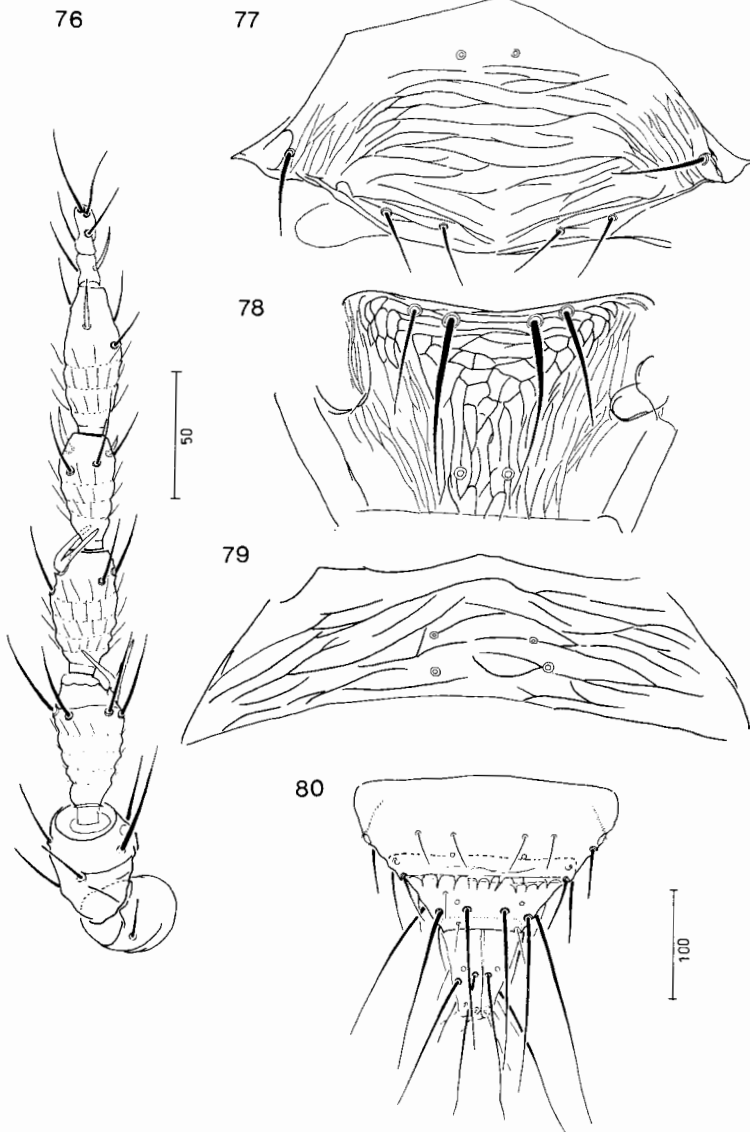
**Morphology.** Head in dorsal aspect (Fig. 30), broader (1.34 times) than long at middle; cheeks slightly sinuouse. Chaetotaxy as follows: postocular setae ii subequal in length to IV. Antennal segments (Fig. 33) typical. Mouth-cone longer than head's dorsal length, projected on anterior three fourths of prosternum. Pronotum (Fig. 30) broader (1.25 times) than long at middle. Mesonotum (Fig. 34); metanotal scutum (Fig. 35); pterosternum (Fig. 31). Abdomen; tergite I (Fig. 36); tergites VIII-X (Fig. 32).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.45 mm.



Figures 71-75

Dorsal views of *Frankliniella exiguavulcanoperotensis* sp. nov. Holotype ♀. 71. Right antenna; 72. Mesosternum; 73. Metanotal scutum; 74. Tergite I; 75 Tergites VIII-X. Scales in  $\mu\text{m}$ , same (400 X) for figure 75; same (1000 X) for figures 71-74.



Figures 76-80

Dorsal views of *Frankliniella nauhcampatepetlensis* sp. nov. Holotype ♀. 76. Right antenna; 77. Mesonotum; 78. Metanotal scutum; 79. Tergite I; 80. Tergites VIII-X. Scales in  $\mu\text{m}$ , same (400 X) for figure 80; same (1000 X) for figures 76-79.

Head dorsal length: 110. Width at eyes: 150, behind eyes: 148, middle: 154, basal: 150. Chaetotaxy, intocc: 54; postoc: ii 22, iii 10, IV 46, v 20. Compound eyes, length: 60, width: 40. Ocelli, fore: 12, hind: 10. Antennal segments, length (width): I 30 (28), II 36 (26), III 58 (22), IV 50 (22), V 40 (20), VI 52 (20), VII 10 (8), VIII 12 (6). Thorax; pronotum, length: 164; width at middle: 202. Chaetotaxy as follows: major setae: AA 84, AM 70; PM, outer: 92, inner: 96; minor setae: aa 34, am 16; pm i: 16, ii: 56, iii: 16. Mesothorax, width: 268; metathorax, width: 242. Fore wings, width at base: 92 middle: 60; veins chaetotaxy, fore: 23, hind: 20. Abdomen; width at segment IV: 315. Tergite IX setae, IX i: 134, IX ii: 144. Tergite X setae, X i: 124.

**Male.** Virtually like adult female, except: antennal segment IV light brown in basal one half, the rest dark brown. All tarsi yellowish brown.

**Measurements** (Paratype ♂ in  $\mu\text{m}$ ). Body length: 1.54 mm.

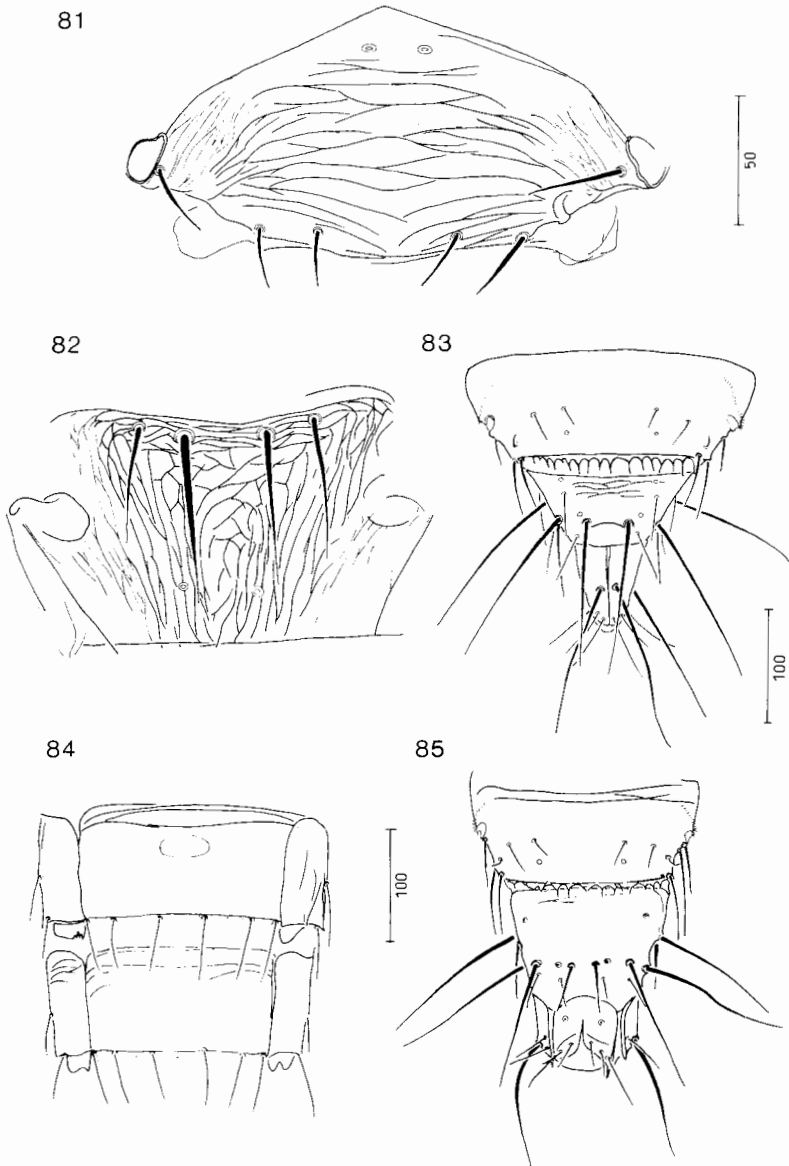
Head dorsal length: 106. Width at eyes, behind eyes: 134, middle: 140, basal: 130. Chaetotaxy, intocc: 50; postoc: ii 18, iii 12, IV 40, v 16. Compound eyes, length: 50, width: 40. Ocelli, fore: 10, hind: 10. Antennal segments, length (width): I 24 (26), II 34 (22), III 48 (20), IV 40 (18), V 32 (18), VI 44 (18), VII 8 (8), VIII 14 (6). Thorax; pronotum, length: 124, width at middle: 178. Chaetotaxy, major setae: AA 72, AM 60; PA, outer: 66, inner: 74; minor setae: aa 28, am 12; pm i: 16, ii: 54, iii: 14. Mesothorax, width: 242; metathorax, width: 224. Fore wings, width at base: 90, middle: 52; veins chaetotaxy, fore: 19, hind: 16. Abdomen; width at segment IV: 230. Tergite IX setae, IX i: 32, IX ii: 102. Tergite X setae, X i: 110.

**Material examined.** Holotype ♀, paratypes: 1 ♀, 1 ♂. MEXICO; VERACRUZ: Volcanic Range, near summit of the Cofre de Perote Volcano, 4100 m.; 7-IX-1977 (Holotype ♀), in flowers of Asteraceae (Roberto M. Johansen), in IBUNAM. ESTADO DE MEXICO: Volcanic Range, on road to the Nevado de Toluca Volcano, 3680 m.; 21-III-1987 (Paratype ♀), in flowers of *Senecio salignus* within *Pinus* Forest (R.M. Johansen), in IBUNAM; *Idem et Ibidem*, 3480 m.; 27-VII-1987 (Paratype ♂), in *Muhlenbergia* sp. within *Pinus* Forest (María Luisa Montes de Oca & R.M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella vulcanoperotensis* sp. nov., share the character of pronotal chaetotaxy (median transverse setae row), with those of *F. axochcoensis*, *F. carmenmendietae*, *F. copilcoensis*, *F. lopezochoterenai*, and *F. paricutinensis*. However, it is different from them, because the mesosternal plate has a broad curved anterior margin (hexagonal in the other species); the tergite VIII has the posteromarginal comb with sparse microtrichia.

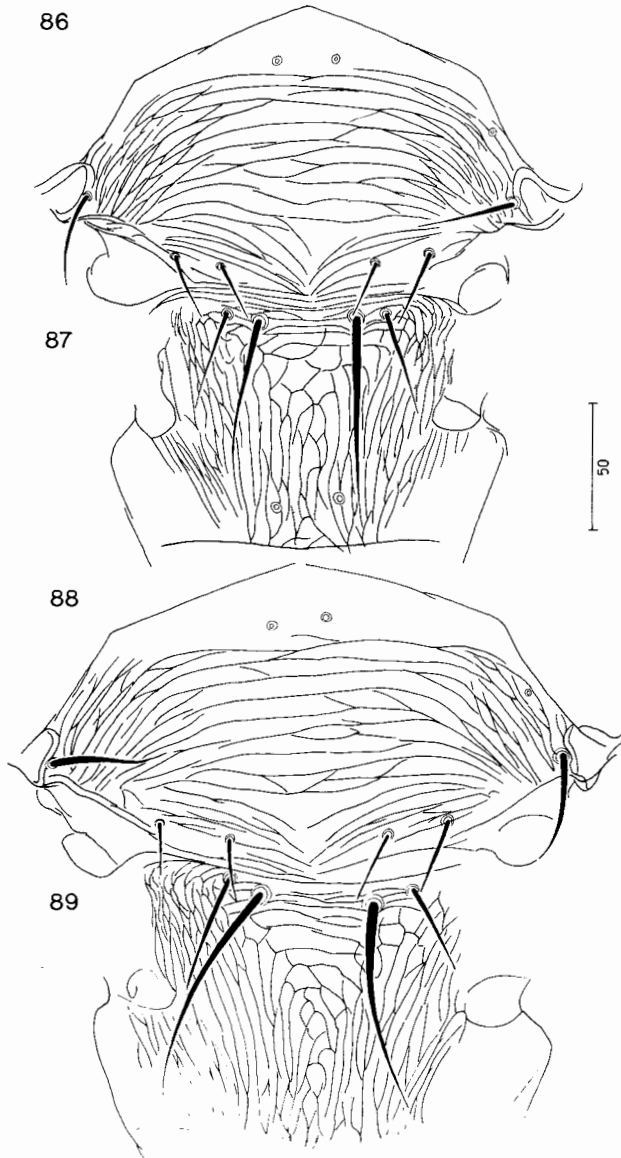
**Derivatio nominis:** from Latin, vulcano = volcano, From Spanish, Pero, Pedro, Perote = big Pero or Pedro (nick name of Pero or Pedro), the name of a city and near volcano; Latin, ensis = locative.





Figures 81-85

Dorsal and ventral views of *Frankliniella* spp. 81. *festucavulcanica* sp. nov. Holotype ♀ mesonotum; 82. *Idem*, metanotal scutum; 83. *Idem*, tergites VIII-X. 84. *carmenmendietae* sp. nov. Paratype ♂ sternites VI-VII (ventral); *Idem*, tergites VIII-X. Scales in  $\mu\text{m}$ , same (400 X) for figures 83-85; same (1000 X) for figures 81-82.



Figures 86-89

Dorsal views of *Frankliniella* spp. 86. *popocatepetlensis* sp. nov. Holotype ♀ mesonotum; 87. *Idem*, metanotal scutum. 88. *jaroslavpelikani* sp. nov. Holotype ♀ mesonotum; 89. *Idem*, metanotal scutum. Scale in  $\mu\text{m}$ , same (1000 X) for all figures.

***Frankliniella vulcanotolucensis* sp. nov.**

(Fig. 51-57, 94)

**Female.** Body color typical, except: antennal segments, III yellow in basal two thirds, the rest dark brown; IV yellow in basal one half, the rest dark brown; V light brown in extreme base, the rest dark brown. Fore tibiae yellowish-brown. All tarsi yellow. Ocellar crescents crimson red.

**Morphology.** Head in dorsal aspect (Fig. 51), broader (1.54 times) than long at middle; cheeks very slightly sinuouse, giving the head a trapezoidal outline; occiput sculptured with close transverse and parallel striae, which become confluent at middle and sides; there is a stronger transverse line at middle. Antennal segments (Fig. 54), III longer than IV and VI. Mouth-cone shorter than head's dorsal length. Pronotum (Fig. 51), almost smooth, but with some faint transverse striae in anterior and posterior margins; without setae at center, but with a median pair of subposteromarginals. Pterothorax; mesonotum (Fig. 55); metanotal scutum (Fig. 56). Abdomen; tergite I (Fig. 57); tergites VIII-X (Fig. 53).

**Measurements** (Holotype ♀ in  $\mu\text{m}$ ). Body length: 1.81 mm.

Head dorsal length: 110. Width at eyes: 160, behind eyes: 158, middle: 170, basal: 168. Chaetotaxy, intocc: 62; postoc: ii 24, iii 16, IV 48, v 22. Compound eyes, length: 60, width: 46. Ocelli, fore: 12, hind: 10. Antennal segments, length (width): I 30 (30), II 42 (26), III 56 (24), IV 48 (24), V 38 (20), VI 50 (20), VII 12 (10), VIII 18 (6). Thorax; pronotum, length: 146, width at middle: 220. Chaetotaxy, major setae: AA 66, AM 52; PA, outer: 70, inner: 70; minor setae: aa 26, am 16; pm i: 14, ii 46, iii 16. Mesothorax, width: 334; metathorax, width: 298. Fore wings, width at base: 116, middle: 70; veins chaetotaxy, fore: 22, hind: 18. Abdomen; width at segment IV: 346. Tergite IX setae, IX i: 150, IX ii: 156. Tergite X setae, X i: 150.

**Material examined.** Holotype ♀, Paratype ♀. MEXICO; ESTADO DE MEXICO: Volcanic Range, on road to the Nevado de Toluca Volcano, 3480 m.; 25-I-1987 (Holotype ♀), in *Muhlenbergia* sp. within *Pinus* Forest (María Luisa Montes de Oca & Roberto M. Johansen), in IBUNAM. DISTRITO FEDERAL: Volcanic Range, Sierra de Ajusco, km 42 on road Méx-95 (México City-Cuernavaca), 3000 m.; 25-IX-1987 (Paratype ♀), in *Muhlenbergia* sp. within *Pinus* Forest (R.M. Johansen), in IBUNAM.

**Comments.** Adults of *Frankliniella vulcanotolucensis* sp. nov., share the character of the pronotum without any setae at center, with those of *F. exiguavulcanoperotensis*, *F. festucavulcanica*, and *F. vulcanorizabaensis*. However, *F. vulcanorizabaensis* lacks the pronotal median subposteromarginal setae. Furthermore, *F. vulcanotolucensis* is different of *F. exiguavulcanoperotensis* and *F. festucavulcanica*, in the following characters: the head with a dorsal trapezoidal outline; the mouth-cone shorter than head's dorsal length; the antecellar setae (pairs I-II) longer than one ocellar diameter; the interocellar (pair III) long (4.0 times of an ocellar diameter); antennal segment III longer than VI. Alternatively, in *F.*

*exiguavulcanoperotensis* and *F. festucavulcanica*, the head has sinuouse cheeks (broader at middle); the mouth-cone is longer than head's dorsal length; the antecellar setae (pairs I-II) are shorter to subequal than one ocellar diameter; the interocellar setae (pair III) are moderately long (2.5-3.3 times of an ocellar diameter); antennal segment III is slightly shorter than VI.

**Derivatio nominis:** from Latin, vulcano = volcano, ensis = locative; from Náhuatl, Tolocan, Tollocan, Toluca = the place of the stoop down head; a city and a close volcano, in the State of México, according to Macazaga (1979).

### Geografic distribution

From a preliminary point of view, the *Frankliniella paricutinensis* "species assemblage" has a recent distribution in Mexico, mainly in the Volcanic Range (Fig. 94), 1990-4100 m. In this last sense the lowest recorded altitude: 1990 m. is for the species *F. vulcanorizabaensis* in the Sierra Negra, where the Volcanic Range is intruded in the Sierra Madre Oriental. The highest recorded altitude (4100 m.) is for the species *Frankliniella festucavulcanica*, and also for *F. vulcanoperotensis* at the Cofre de Perote (Nauhcampatépétl) Volcano; the mean between both altitude extremes is 3226 m. Furthermore, Table 1 shows that the Central Region of the Mexican Volcanic Range (Distrito Federal, Estado de México, and Estado de Morelos) ranks as the first in the species number (10), and with a 76.92%; whereas the Eastern Region (state of Puebla, and state of Veracruz) has the second place with five species (38.46%); the Western Region only has one recorded species (7.69%).

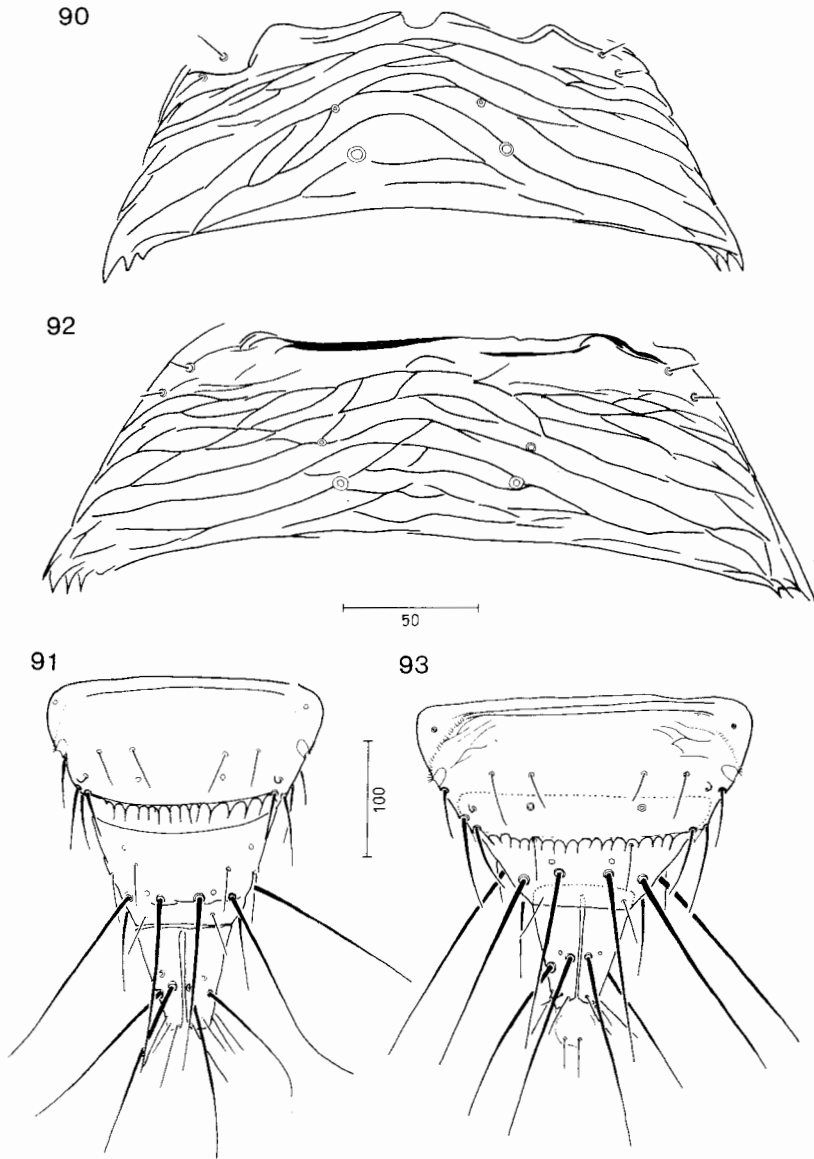
Another interesting distributional fact, is that while the *Frankliniella desertileonidum* species assemblage is mainly distributed in the Sierra Madre Oriental (with one species: *F. desertileonidum* in the Volcanic Range), the *F. paricutinensis* species assemblage is mainly distributed in the Volcanic Range (with one species: *F. vulcanorizabaensis* shared with the Sierra Madre Oriental). The above information is the only available up to the present time.

### Some ecologic data

Up the present time, only adults of the species in the *Frankliniella paricutinensis* species assemblage are known. They live within *Quercus-Pinus* forests, in litter (pupation site ?), herbaceous, Poaceae, and Asteraceae flowers, but also in Alpine grassland of *Festuca* sp.

Table 3 shows that nine species with 21 adult individuals (38.88%) of the total recorded adults, were sampled in Poaceae with floral structures (mainly *Muhlenbergia macroura*).

Perhaps some of these specimens are incidental visitors carried by winds (which are frequent at high altitudes). The Asteraceae flowers, ranked in the second place with seven species, and 21 adult individuals, but giving the same percentage (38.88%) as in the Poaceae.



Figures 90-93

Dorsal views of *Frankliniella* spp. 90. *popocatepetlensis* sp. nov. Holotype ♀ tergite I; 91. *Idem*, tergites VIII-X. 92. *jaroslavpelikani* sp. nov. Holotype ♀ tergite I; 93. *Idem*, tergites VIII-X. Scales in  $\mu\text{m}$ , same (400 X) for figures 91, 93; same (1000 X) for figures 90, 92.

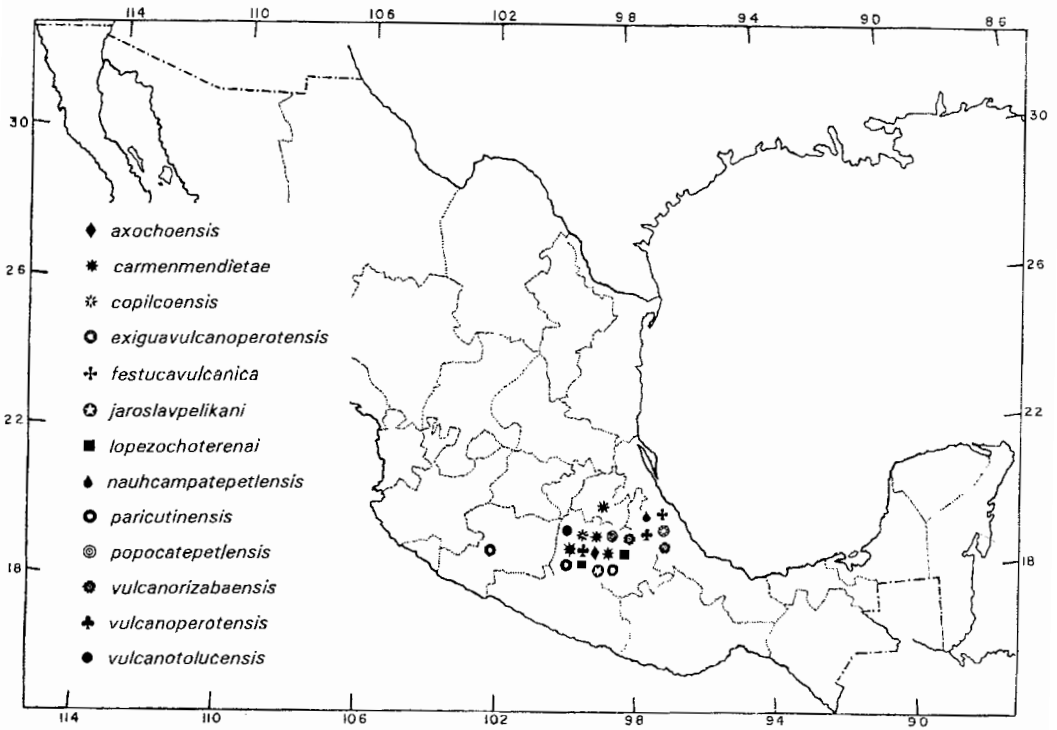


Figure 94  
The *Frankliniella paricutinensis* "species assemblage" distribution in Mexico, in the Volcanic Range

Table 1

The distribution of the *Frankliniella paricutinensis* "species assemblage", in the regions within the Mexican Volcanic Range

Eastern spp.	Central spp.	Western spp.
1. <i>exiguavulcanoperotensis</i>	1. <i>axochcoensis</i>	1. <i>paricutinensis</i>
2. <i>festucavulcanica</i>	2. <i>carmenmendietae</i>	
3. <i>nauhcampatepetlensis</i>	3. <i>copilcoensis</i>	
4. <i>vulcanorizabaensis</i>	4. <i>jaroslavpelikani</i>	
5. <i>vulcanoperotensis</i>	5. <i>lopezochoterenai</i>	
	6. <i>paricutinensis</i>	
	7. <i>popocatepetlensis</i>	
	8. <i>vulcanorizabaensis</i>	
	9. <i>vulcanoperotensis</i>	
	10. <i>vulcanotolucensis</i>	
38.46%	76.92%	7.69%

**Table 2**

Species frequency of the *Frankliniella paricutinensis* "species assemblage", in the Mexican Volcanic Range.

sp.	No. adults		TI.	%
	♀♀	♂♂		
1. <i>copilcoensis</i>	7	7	14	25.92
2. <i>paricutinensis</i>	11	2	13	24.07
3. <i>axochcoensis</i>	7	-	7	12.96
4. <i>vulcanorizabaensis</i>	2	2	4	7.40
5. <i>carmenmendietae</i>	1	2	3	5.55
6. <i>vulcanoperotensis</i>	2	1	3	5.55
7. <i>lopezochoterenai</i>	2	-	2	3.70
8. <i>nauhcampatepetlensis</i>	2	-	2	3.70
9. <i>vulcanotolucensis</i>	2	-	2	3.70
10. <i>exiguavulcanoperotensis</i>	1	-	1	1.85
11. <i>festucavulcanica</i>	1	-	1	1.85
12. <i>jaroslavpelikani</i>	1	-	1	1.85
13. <i>popocatepetlensis</i>	1	-	1	1.85
TIs	40	14	54	♀♀ = 74.07 ♂♂ = 25.93

**Table 3**

Species frequency of the *Frankliniella paricutinensis* "species assemblage", in three different microhabitats

Asteraceae		Poaceae		Miscellaneous herbs & litter	
sp.	No. adults	sp.	No. adults	sp.	No. adults
1. <i>carmenmendietae</i>	1	1. <i>carmenmendietae</i>	2	1. <i>axochcoensis</i>	7
2. <i>copilcoensis</i>	8	2. <i>copilcoensis</i>	6	2. <i>exiguavulcanoperotensis</i>	1
3. <i>jaroslavpelikani</i>	1	3. <i>festucavulcanica</i>	1	3. <i>lopezochoterenai</i>	1
4. <i>lopezochoterenai</i>	1	4. <i>nauhcampatepetlensis</i>	1	4. <i>vulcanorizabaensis</i>	2
5. <i>nauhcampatepetlensis</i>	1	5. <i>paricutinensis</i>	5		
6. <i>paricutinensis</i>	7	6. <i>popocatepetlensis</i>	1		
7. <i>vulcanoperotensis</i>	2	7. <i>vulcanorizabaensis</i>	2		
		8. <i>vulcanoperotensis</i>	1		
		9. <i>vulcanotolucensis</i>	2		
	TI. 21		TI. 21		TI. 11
	% = 38.88		% = 38.88		% = 20.37

Species within the *Frankliniella paricutinensis* "species assemblage", are flower dwellers, as shown in my samples. Only four species represented by four adult individuals (20.37%) were sampled by beating herbaceous, and by the Berlese funnel extraction method of litters. Concerning with the species frequency, the species *Frankliniella copilcoensis* and *F. paricutinensis* ranked as the most abundant (25.92 and 24.07% respectively), followed by: *F. axochcoensis* (12.96%), *F. vulcanorizabaensis* (7.40%), *F. carmenmendietae*, and *F. vulcanoperotensis* (each with 5.55%). All these six species are known in the bisexual condition.

Since the considered data only included adult samples of all the material found in the IBUNAM Collections, the species frequency as shown in Table 2 has a preliminary basis. It is interesting to say here, that the samplings of the species *Frankliniella lopezochoterenai*, *F. paricutinensis* and *F. popocatepetlensis* in the area of the Sierra Nevada (Iztacihuatl-Popocatepetl volcanoes), were carried out monthly during the year 1985, that is nine years before the start of the great volcanic activity of the Popocatepetl Volcano started in december, 1994 to date.

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